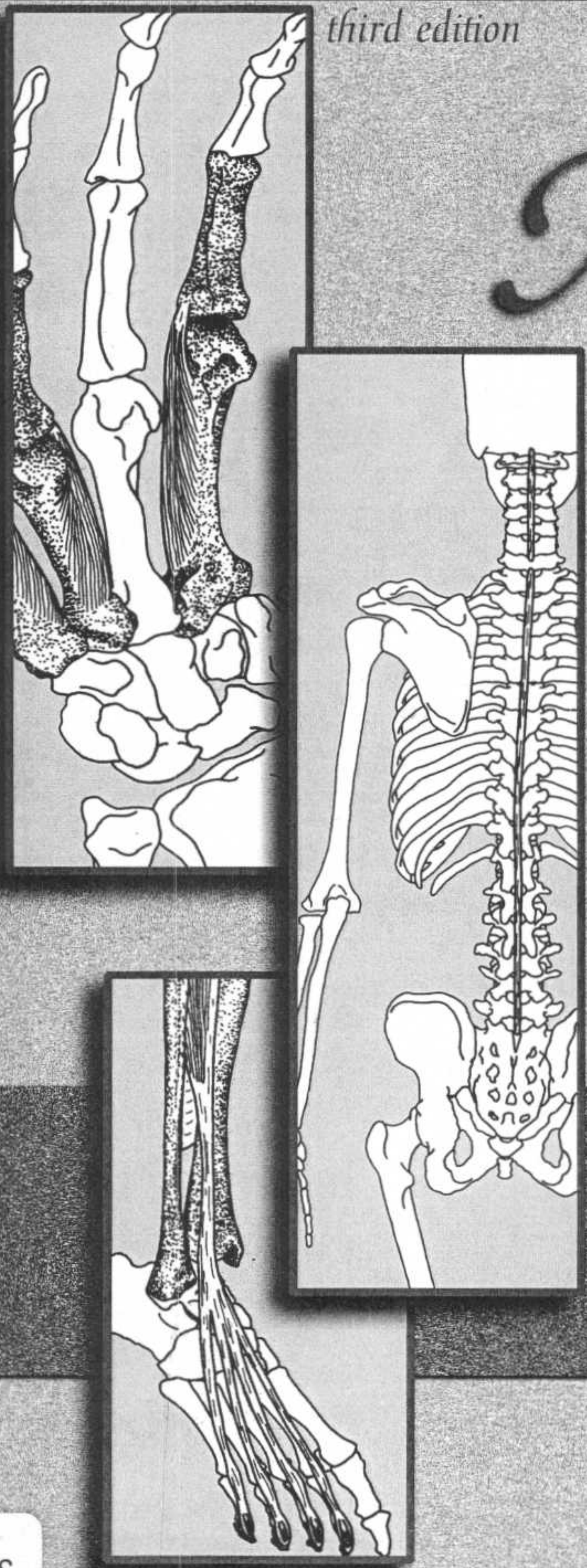
INTERNATIONAL EDITION

*third edition*

# Atlas of Skeletal Muscles



ROBERT J. STONE

JUDITH A. STONE

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# PREFACE

This book is a study guide and reference for the anatomy and actions of human skeletal muscles. It is designed for use by students of anatomy, physical education and health-related fields. It also serves as a compact reference for the practicing professional.

The first chapter presents labeled line drawings of the skeleton, which include all structures that are used in describing origins and insertions in the later chapters. A master numbering system is used so that each structure is labeled with the same number in all drawings.

The second chapter describes the various movements of the body.

In chapters 3 through 9 the origin, insertion, action and innervation of the skeletal muscles are described and each muscle is presented on a separate page with a line drawing.

The spinal cord levels of the nerve fibers that innervate each muscle are included in parentheses after the name of each nerve.

Labeled drawings of major muscle groups are presented throughout chapters 3 to 9. Notes and relationships among muscles have been included on many pages.

The drawings include the following important features:

1. Bones and cartilage containing muscle attachment sites are shaded.
2. Adjacent structures are shown.
3. Muscle fibers are drawn by direction.
4. Muscle fibers are shown on the undersurface of bone and cartilage as dashed lines.
5. Tendons and aponeuroses are shown.
6. Labeled muscle groups are included.

These features aid in visual orientation and understanding of the action of the muscles. We have noticed that many students find it useful to color the illustrations.

Notes have been included on many pages to show how muscles are used. Relationships among many of the muscles have also been indicated where appropriate. Many more of these have been included in the third edition.

Since our primary goal is to describe the muscles moving the skeleton, we have not described the muscles of the perineum, eye, tympanic cavity, tongue, larynx, pharynx, or palate.

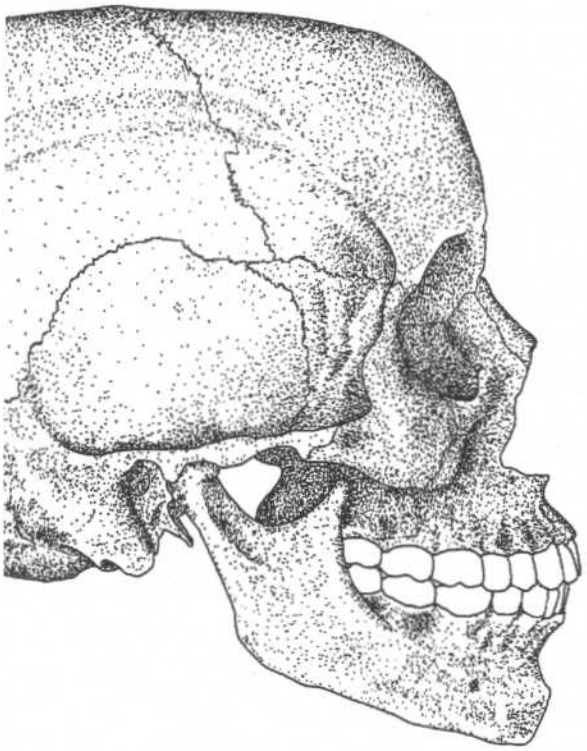
We extend our appreciation to Mr. George Boykin, who was for many years the jolly proprietor of the gross anatomy laboratories at the Health Sciences Center of the State University of New York at Stony Brook, for his help and encouragement. We also thank Mr. Vincent Verdisco and Ms. Diane Chandler for their technical advice with the artwork and Ms. Katherine Juner for her secretarial services.

**Robert J. Stone**

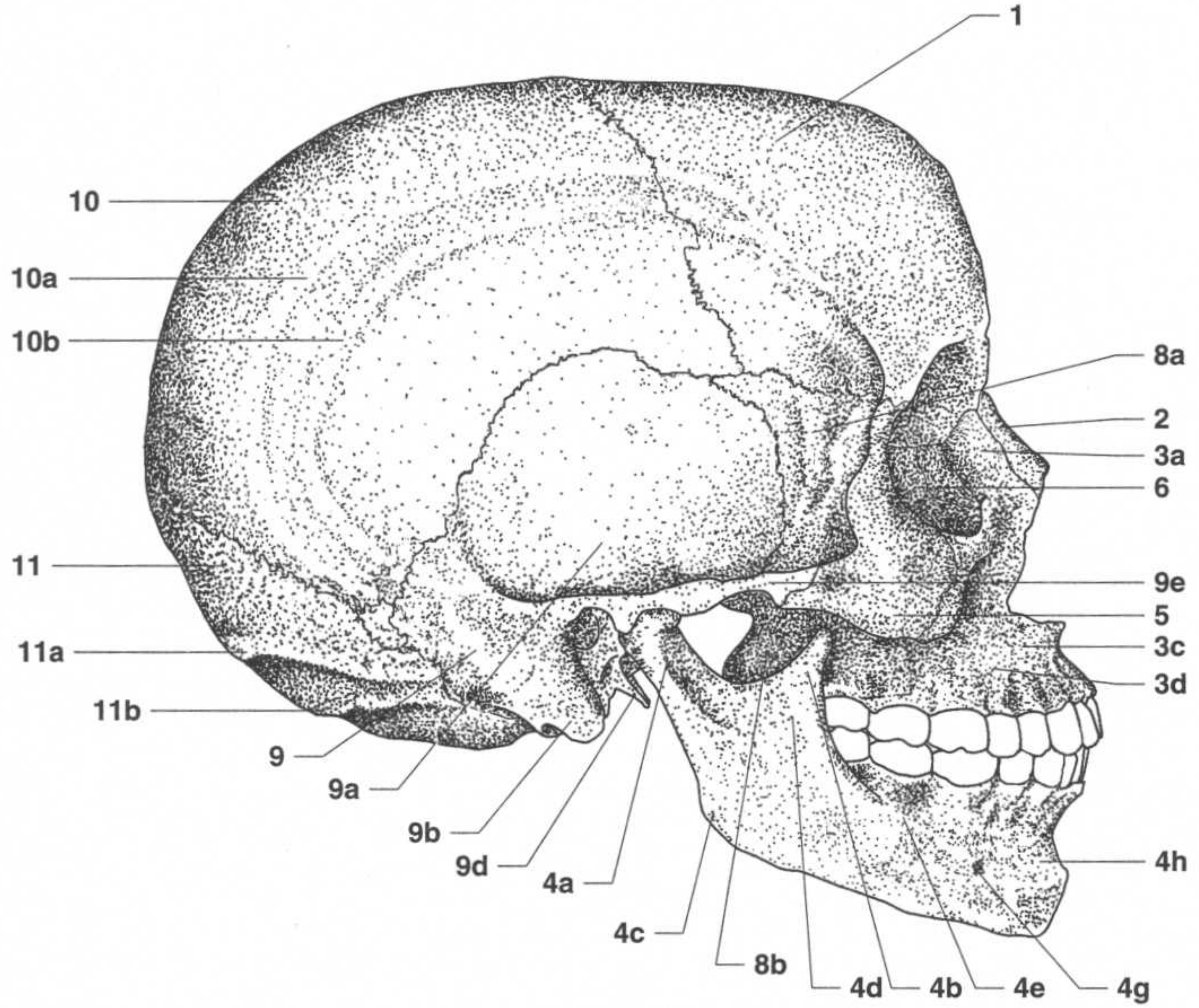
**Judith A. Stone**

## CHAPTER ONE

# THE SKELETON



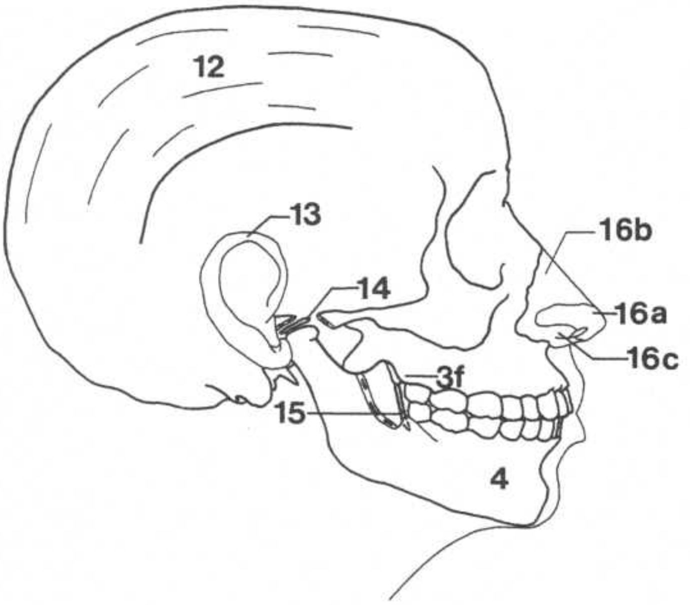
# SKULL—LATERAL VIEW



**1.** Frontal bone
**2.** Nasal bone
**3a.** Frontal process (maxilla)
**3c.** Incisive fossa of maxilla
**3d.** Canine fossa (maxilla)
**4a.** Neck of condyle (mandible)
**4b.** Coronoid process (mandible)
**4c.** Angle of the mandible
**4d.** Ramus (mandible)
**4e.** Oblique line (mandible)
**4g.** Mental foramen (mandible)
**4h.** Incisive fossa of mandible
**5.** Zygomatic bone
**6.** Lacrimal bone
**8a.** Greater wing of sphenoid bone
**8b.** Lateral pterygoid plate
**9.** Temporal bone
**9a.** Temporal fossa
**9b.** Mastoid process (temporal bone)
**9d.** Styloid process (temporal bone)
**9e.** Zygomatic process (temporal bone)
**10.** Parietal bone
**10a.** Superior temporal line
**10b.** Inferior temporal line
**11.** Occipital bone
**11a.** Superior nuchal line (occipital bone)
**11b.** Inferior nuchal line (occipital bone)

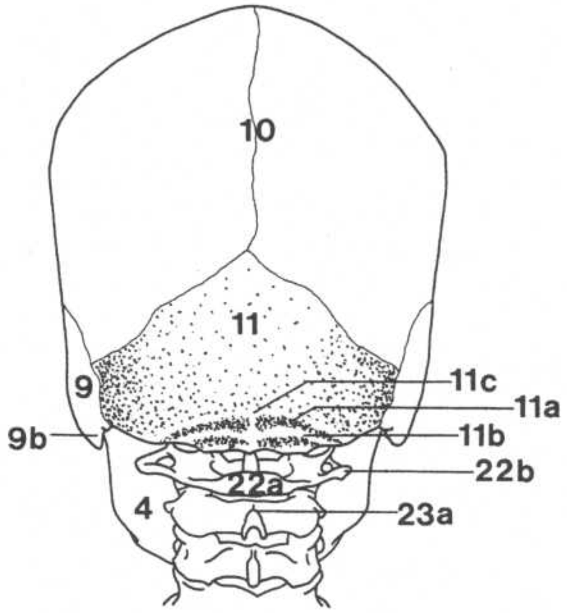
Note: The zygomatic arch is formed by the zygomatic process of the temporal bone meeting the zygomatic bone.

## SKULL—LATERAL VIEW



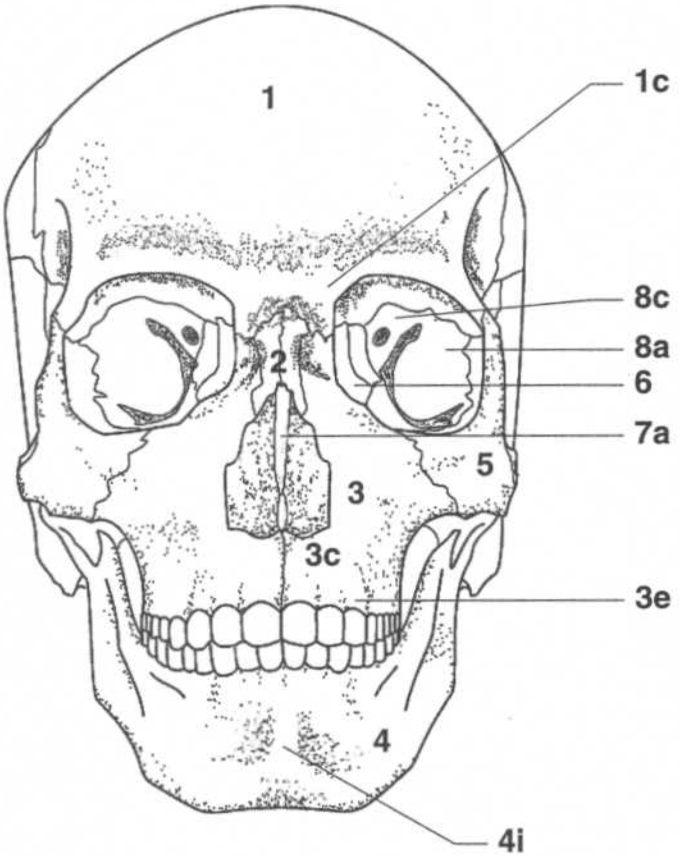
**3f.** Tuberosity of maxilla
**4.** Mandible
**12.** Galea aponeurotica
**13.** Helix of ear
**14.** Articular disk of temporomandibular joint
**15.** Pterygomandibular raphe
**16a.** Greater alar cartilage
**16b.** Nasal cartilage
**16c.** Ala

## SKULL—POSTERIOR VIEW



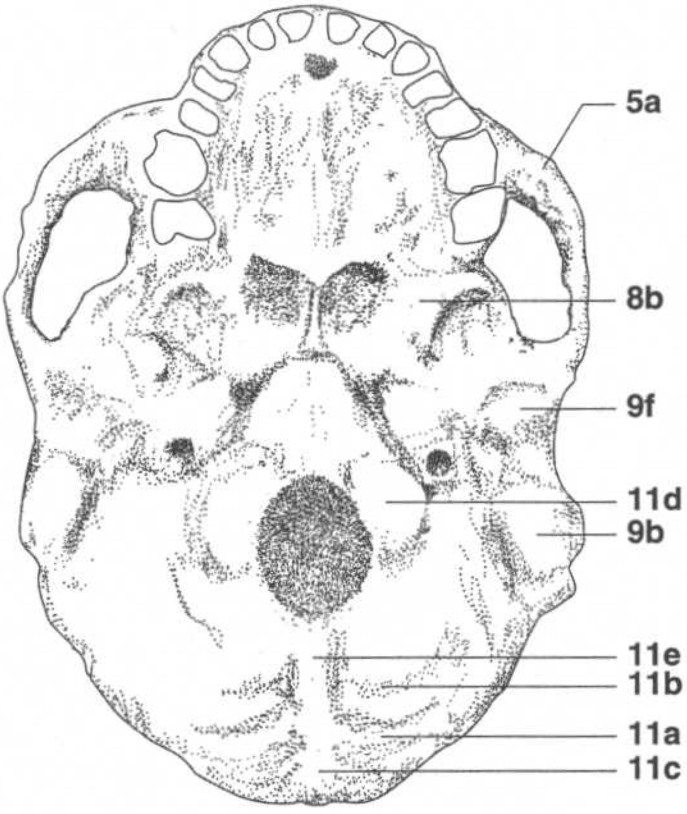
**4.** Mandible
**9.** Temporal bone
**9b.** Mastoid process (temporal bone)
**10.** Parietal bone
**11.** Occipital bone
**11a.** Superior nuchal line (occipital bone)
**11b.** Inferior nuchal line (occipital bone)
**11c.** External occipital protuberance
**22a.** Posterior arch of atlas
**22b.** Transverse process of atlas
**23a.** Spinous process of axis

# SKULL—ANTERIOR VIEW



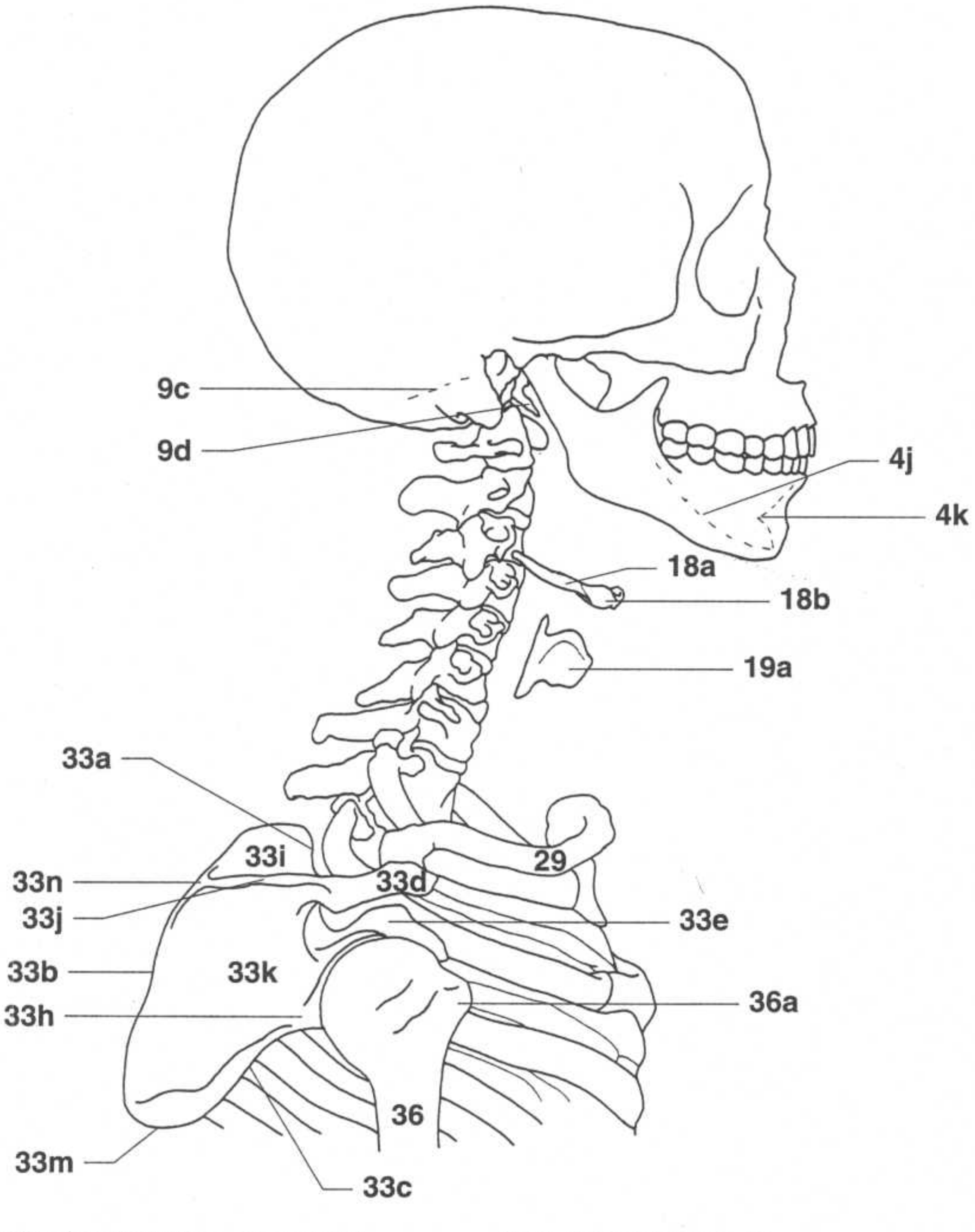
**1.** Frontal bone
**1c.** Superciliary arch (frontal bone)
**2.** Nasal bone
**3.** Maxilla
**3c.** Incisive fossa of maxilla
**3e.** Alveolar border of maxilla
**4.** Mandible
**4i.** Symphysis of mandible
**5.** Zygomatic bone
**6.** Lacrimal bone
**7a.** Nasal septum (ethmoid bone)
**8a.** Greater wing of sphenoid bone
**8c.** Lesser wing of sphenoid bone

# SKULL—INFERIOR (BASAL) VIEW



**5a.** Zygomatic arch
**8b.** Lateral pterygoid plate
**9b.** Mastoid process (temporal bone)
**9f.** Mandibular process (temporal bone)
**11a.** Superior nuchal line (occipital bone)
**11b.** Inferior nuchal line (occipital bone)
**11c.** External occipital protuberance (occipital bone)
**11d.** Occipital condyle (occipital bone)
**11e.** External occipital crest (occipital bone)

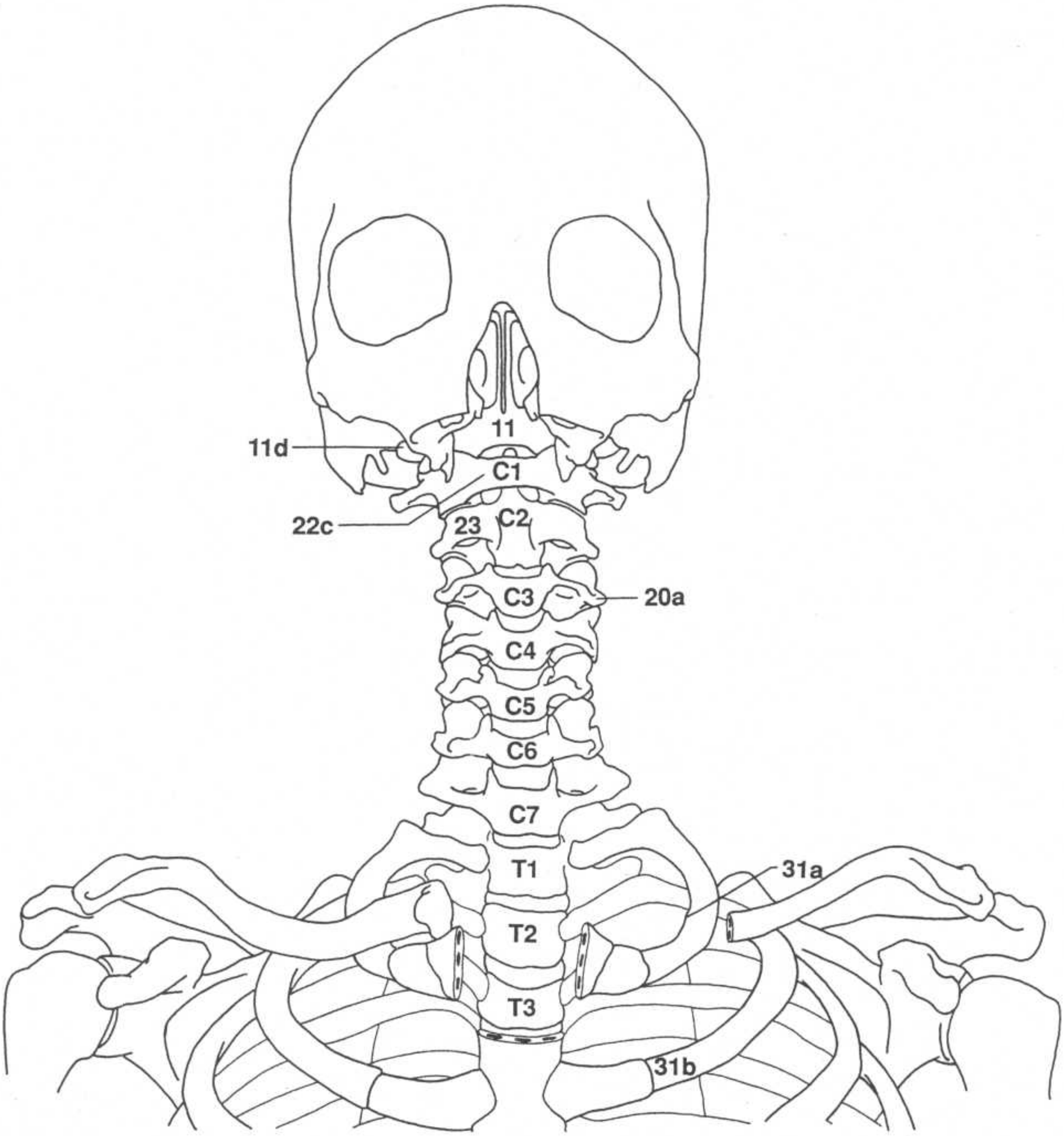
# SKULL TO HUMERUS—LATERAL VIEW



- **4j.** Mylohyoid line (medial surface of mandible)
- **4k.** Inferior mental spine (inner surface of mandible)
- **9c.** Mastoid notch (medial surface of temporal bone)
- **9d.** Styloid process (temporal bone)
- **18a.** Greater cornu of hyoid
- **18b.** Body of hyoid
- **19a.** Lamina of thyroid cartilage
- **29.** Clavicle
- **33a.** Superior border of scapula
- **33b.** Vertebral (medial) border of scapula
- **33c.** Axillary (lateral) border of scapula
- **33d.** Acromion (scapula)
- **33e.** Coracoid process (scapula)
- **33h.** Infraglenoid tubercle (scapula)
- **33i.** Supraspinous fossa (scapula)
- **33j.** Crest of spine (scapula)
- **33k.** Infraspinous fossa (scapula)
- **33m.** Inferior angle of scapula
- **33n.** Root of spine (scapula)
- **36.** Humerus
- **36a.** Greater tuberosity of humerus

# SKULL TO STERNUM—ANTERIOR VIEW

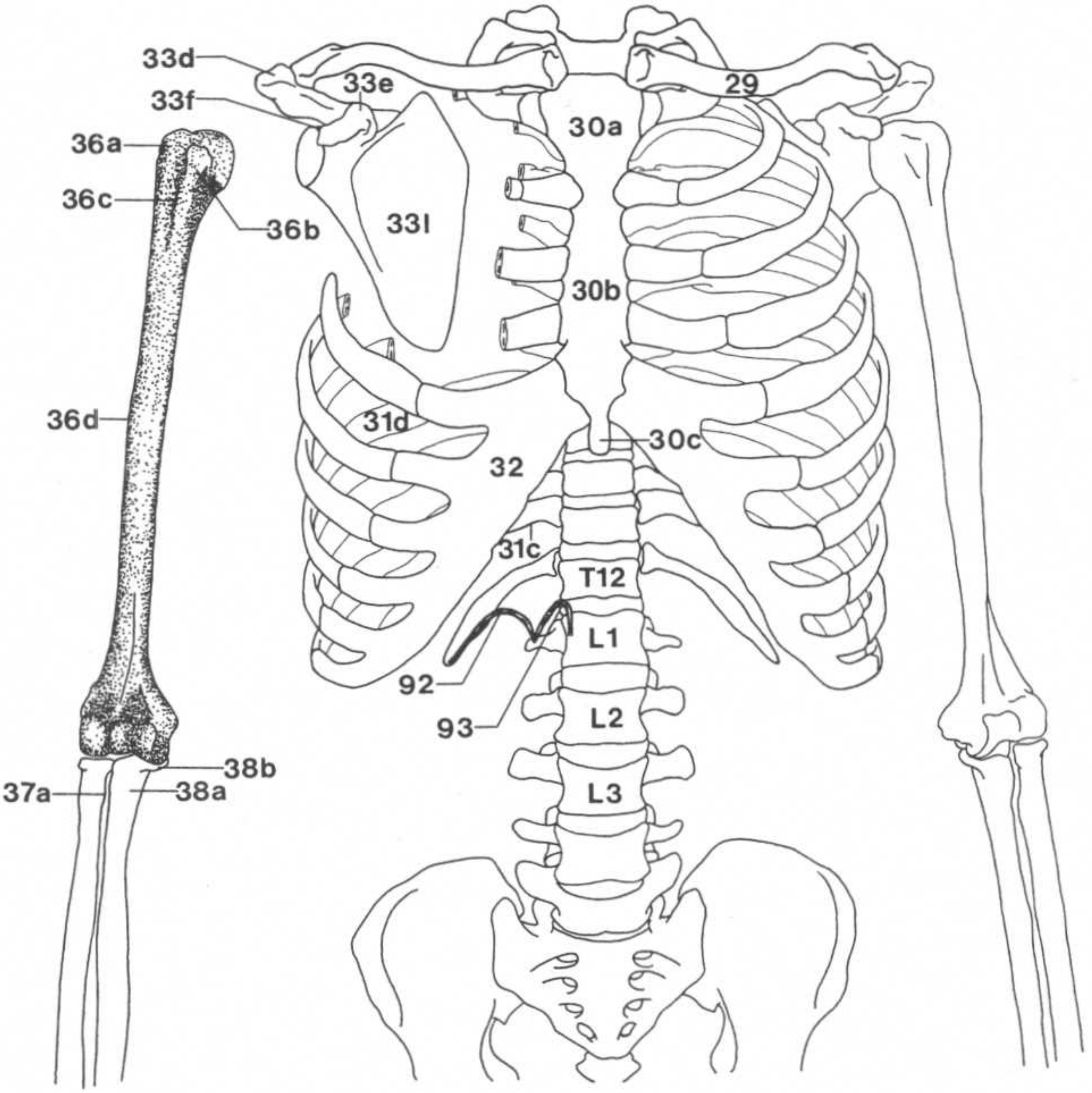
*(Mandible and maxilla removed)*


11
11d
C1
22c
23
C2
C3
20a
C4
C5
C6
C7
T1
31a
T2
T3
31b

**11.** Occipital bone
**11d.** Jugular process of occipital bone
**20a.** Transverse process of vertebra
**22c.** Anterior arch of atlas
**23.** Axis
**31a.** Scalene tubercle of first rib
**31b.** Second rib

# RIB CAGE, PECTORAL GIRDLE, UPPER ARM—ANTERIOR VIEW

*(Ribs partially removed, right arm disarticulated)*



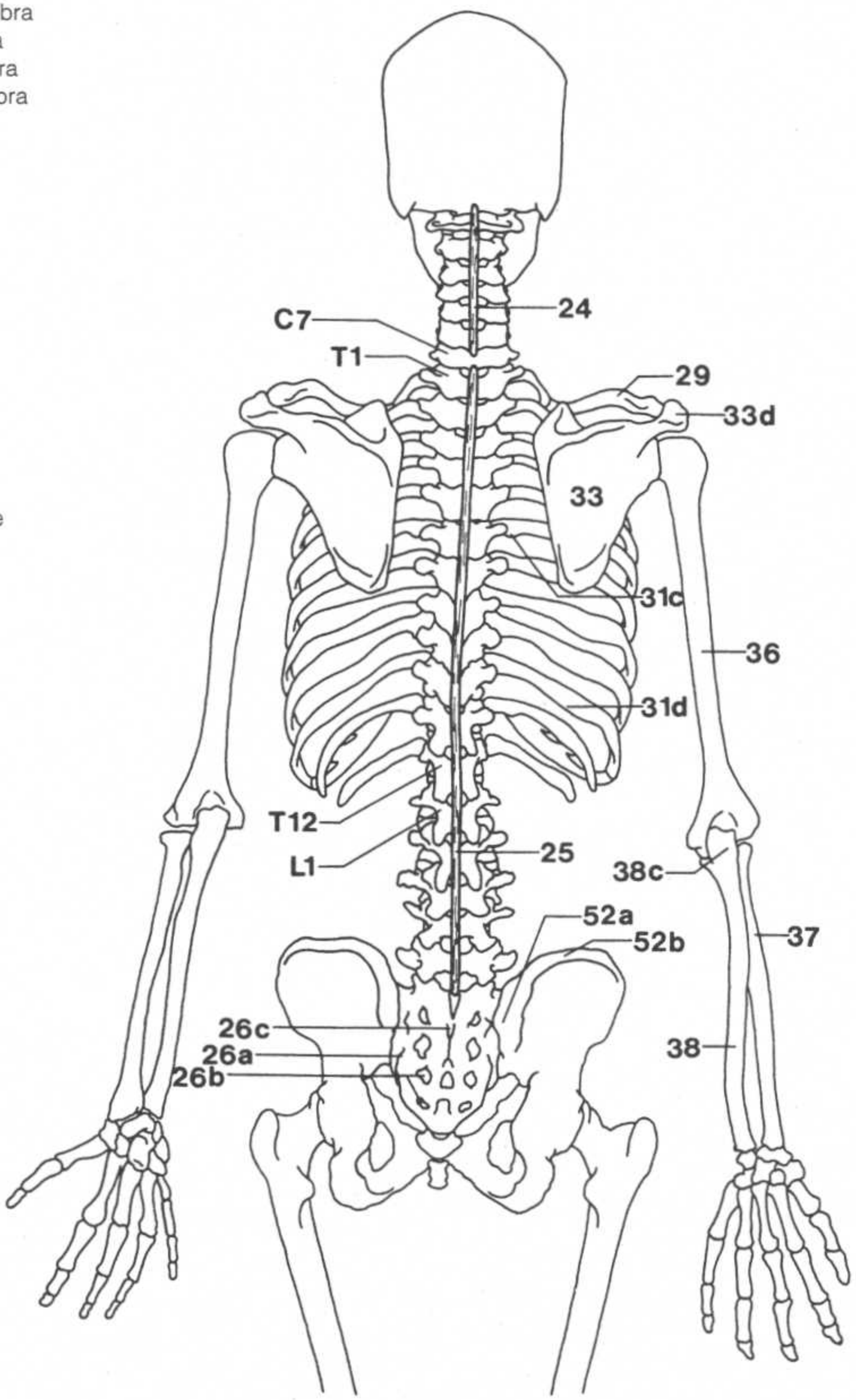
**29.** Clavicle
**30a.** Manubrium (sternum)
**30b.** Body (sternum)
**30c.** Xiphoid process (sternum)
**31c.** Tubercle of rib
**31d.** Angle of rib
**32.** Costal cartilage
**33d.** Acromion (scapula)
**33e.** Coracoid process (scapula)
**33f.** Supraglenoid tubercle (scapula)
**33l.** Subscapular fossa (scapula)
**36a.** Greater tuberosity (tubercle) of humerus
**36b.** Lesser tuberosity of humerus
**36c.** Intertubercular (bicipital) groove (humerus)
**36d.** Deltoid tuberosity (humerus)
**37a.** Radial tuberosity (radius)
**38a.** Ulnar tuberosity (ulna)
**38b.** Coronoid process (ulna)
**92.** Lateral lumbocostal arch (lateral arcuate ligament)*
**93.** Medial lumbocostal arch (medial arcuate ligament)

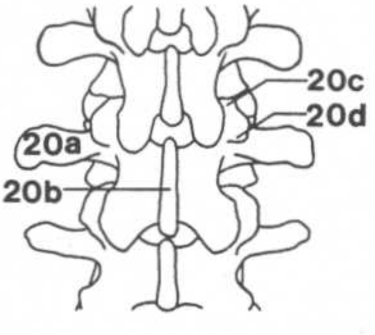
*See p. 89.

# SKELETON—POSTERIOR VIEW

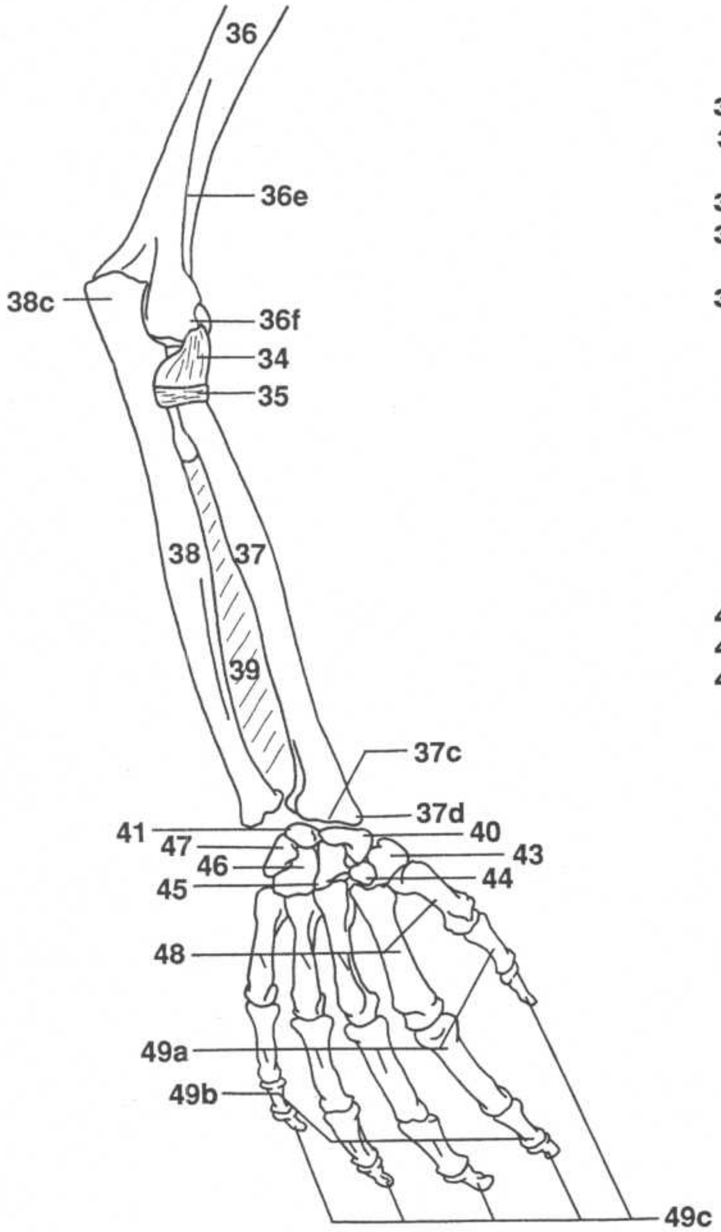
*(Enlargement of lumbar vertebrae)*

**20a.** Transverse process of vertebra
**20b.** Spinous process of vertebra
**20c.** Mamillary process of vertebra
**20d.** Accessory process of vertebra
**24.** Ligamentum nuchae
**25.** Supraspinous ligaments
**26a.** Lateral sacral crest
**26b.** Sacral foramina
**26c.** Medial sacral crest
**29.** Clavicle
**31c.** Tubercle of rib
**31d.** Angle of rib
**33.** Scapula
**33d.** Acromion (scapula)
**36.** Humerus
**37.** Radius
**38.** Ulna
**38c.** Olecranon process (ulna)
**52a.** Posterior superior iliac spine
**52b.** Iliac crest


C7
24
T1
29
33d
33
31c
36
31d
T12
L1
25
38c
52a
52b
37
26c
26a
26b
38

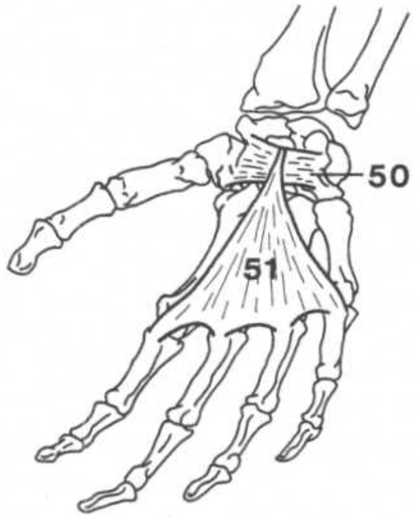

20c
20d
20a
20b

# RIGHT ARM—POSTERIOR VIEW


36
36e
38c
36f
34
35
38
37
39
37c
37d
40
43
44
41
47
46
45
48
49a
49b
49c

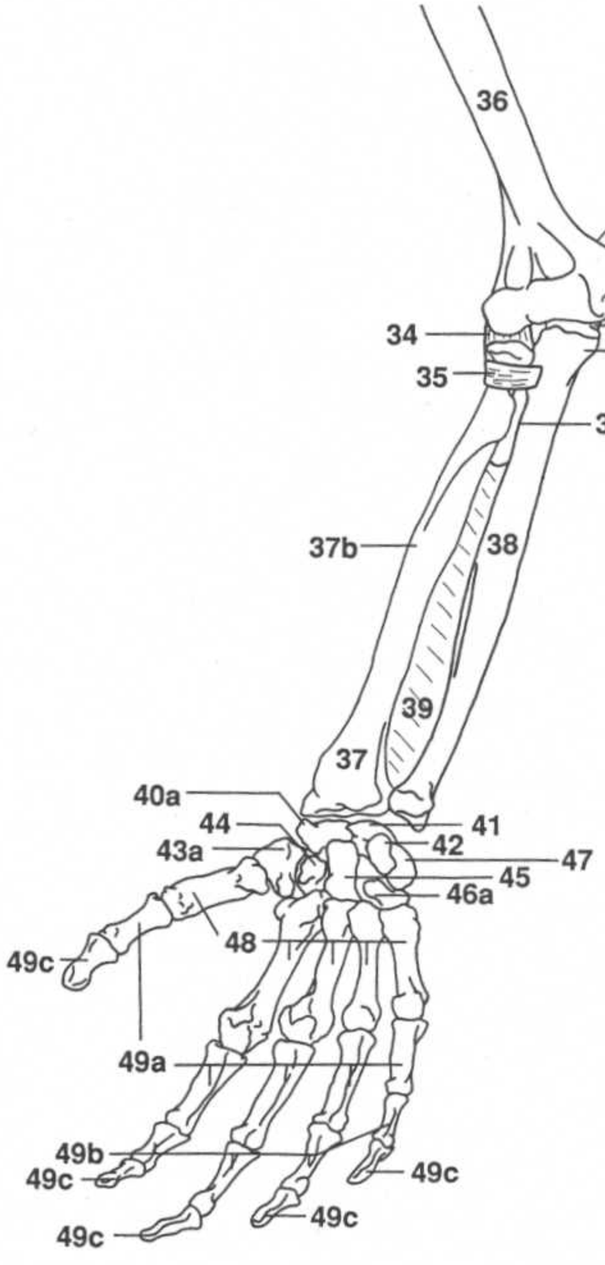
**34.** Radial collateral ligament
**35.** Annular ligament
**36.** Humerus
**36e.** Lateral supracondylar ridge (humerus)
**36f.** Lateral epicondyle (humerus)
**37.** Radius
**37c.** Dorsal tubercle (radius)
**37d.** Styloid process (radius)
**38.** Ulna
**38c.** Olecranon process (ulna)
**39.** Interosseous membrane
**40.** Scaphoid (navicular)
**41.** Lunate
**43.** Trapezium
**44.** Trapezoid
**45.** Capitate
**46.** Hamate
**47.** Triquetrum
**48.** Metacarpals
**49a.** Proximal phalanges
**49b.** Middle phalanges
**49c.** Distal phalanges

## RIGHT HAND—ANTERIOR VIEW

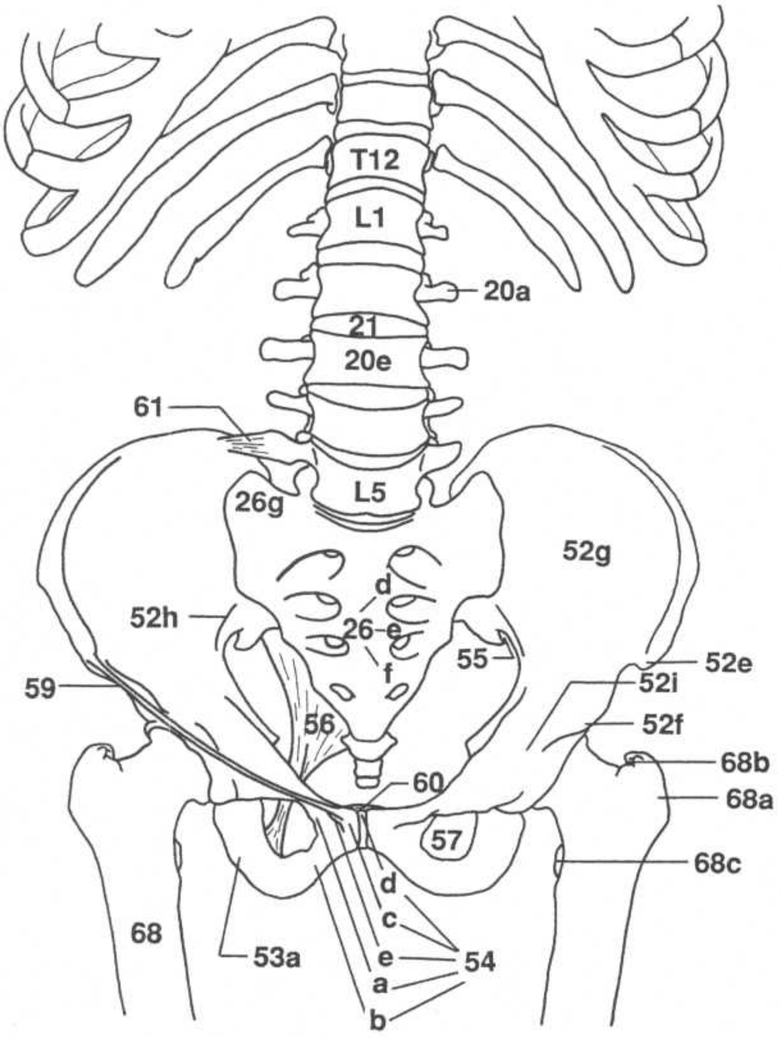


**34.** Radial collateral ligament
**35.** Annular ligament
**36.** Humerus
**36g.** Medial supracondylar ridge (humerus)
**36h.** Medial epicondyle (humerus)
**37.** Radius
**37b.** Pronator tuberosity (radius)
**38.** Ulna
**38b.** Coronoid process (ulna)
**38c.** Olecranon process (ulna)
**38d.** Supinator crest (ulna)
**39.** Interosseous membrane
**40a.** Tubercle of scaphoid (navicular)
**41.** Lunate
**42.** Pisiform
**43a.** Tubercle of trapezium
**44.** Trapezoid
**45.** Capitate
**46a.** Hook of hamate
**47.** Triquetrum
**48.** Metacarpals
**49a.** Proximal (first) phalanges
**49b.** Middle (second) phalanges
**49c.** Distal (third) phalanges
**50.** Flexor retinaculum
**51.** Palmar aponeurosis

## RIGHT ARM—ANTERIOR VIEW


36
36g
36h
34
38c
38b
35
38d
37b
38
39
37
40a
44
41
43a
42
47
45
46a
48
49c
49a
49b
49c
49c
49c
49c

# LUMBAR AND PELVIC REGION—ANTERIOR VIEW


T12
L1
20a
21
20e
61
26g
L5
52g
d
26
e
f
52h
55
52e
59
52i
52f
56
68b
60
68a
57
68c
d
c
68
53a
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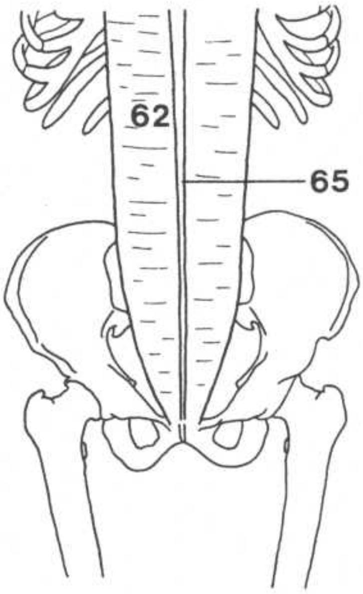
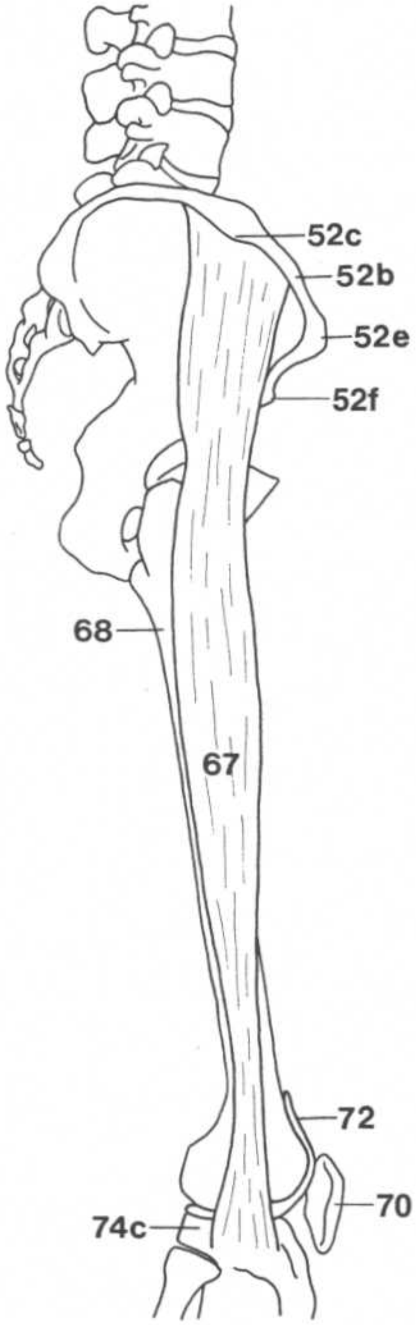
54
a
b



**20a.** Transverse process of vertebra
**20e.** Body of vertebra
**21.** Intervertebral disk
**26d.** Second sacral vertebra
**26e.** Third sacral vertebra
**26f.** Fourth sacral vertebra
**26g.** Ala of sacrum
**52e.** Anterior superior iliac spine
**52f.** Anterior inferior iliac spine
**52g.** Iliac fossa
**52h.** Arcuate line (ilium)
**52i.** Iliopectineal eminence (ilium)
**53a.** Ramus of ischium
**54a.** Superior ramus of pubis
**54b.** Inferior ramus of pubis
**54c.** Pubic crest
**54d.** Pubic symphysis
**54e.** Pubic tubercle
**55.** Greater sciatic notch
**56.** Sacrotuberous ligament
**57.** Obturator foramen
**59.** Inguinal ligament
**60.** Superior pubic ligament
**61.** Iliolumbar ligament
**62.** Rectus sheath
**65.** Linea alba
**68.** Femur
**68a.** Greater trochanter (femur)
**68b.** Trochanteric fossa (femur)
**68c.** Lesser trochanter (femur)

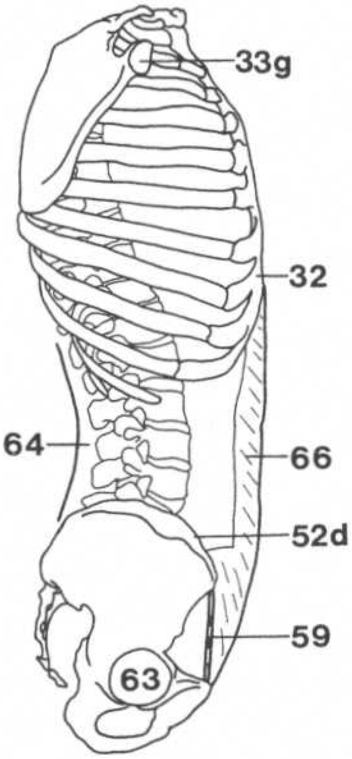
## PELVIC GIRDLE TO KNEE—LATERAL VIEW



**52b.** Iliac crest
**52c.** Iliac tubercle
**52e.** Anterior superior iliac spine
**52f.** Anterior inferior iliac spine
**67.** Iliotibial tract
**68.** Femur
**70.** Patella
**72.** Synovial membrane of knee joint
**74c.** Lateral condyle of tibia

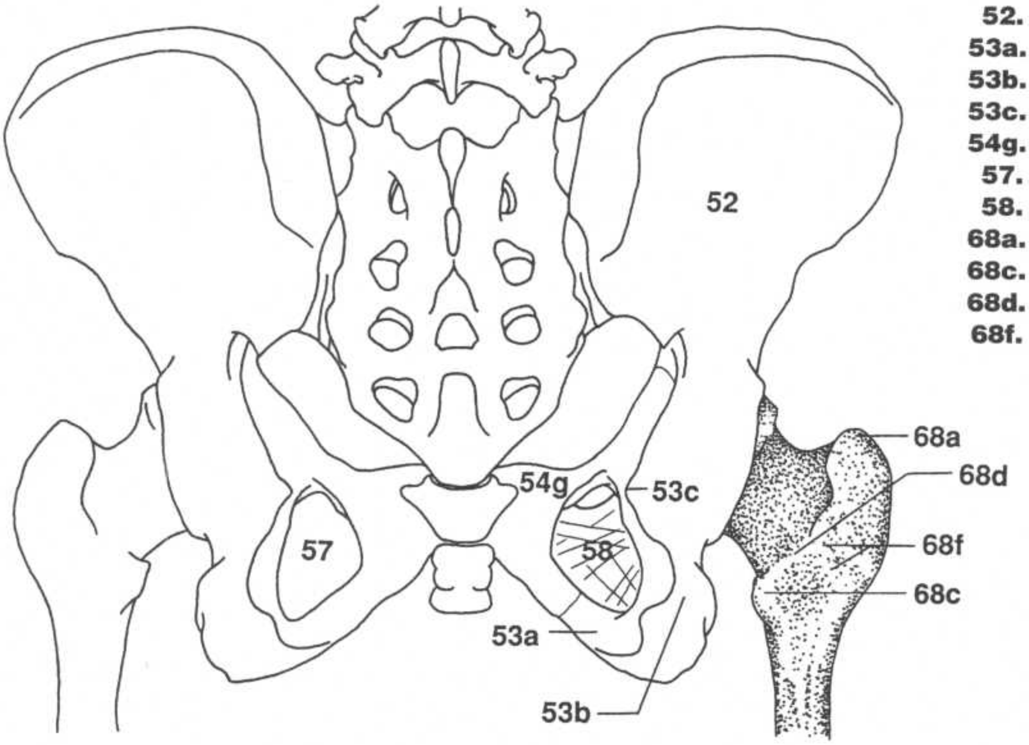
## THORACIC TO PELVIC REGION—LATERAL VIEW

*(Arm and leg removed)*



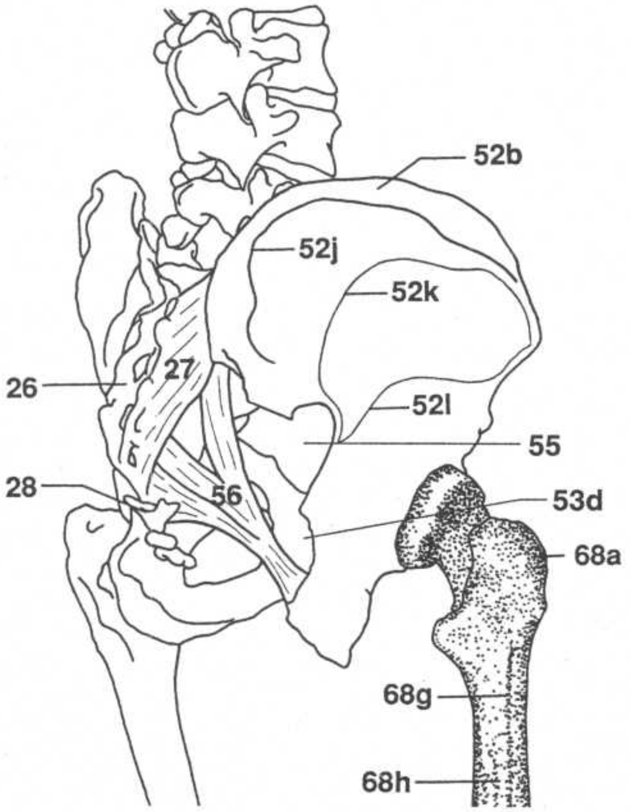
**32.** Costal cartilage
**33g.** Glenoid cavity (scapula)
**52d.** Anterior iliac crest
**59.** Inguinal ligament
**63.** Acetabulum
**64.** Thoracolumbar fascia
**66.** Abdominal aponeurosis

# PELVIC GIRDLE—POSTERIOR VIEW


52
54g
53c
57
58
53a
53b
68a
68d
68f
68c

**52.** Ilium
**53a.** Ramus of ischium
**53b.** Ischial tuberosity
**53c.** Spine of ischium
**54g.** Body of pubis
**57.** Obturator foramen
**58.** Obturator membrane
**68a.** Greater trochanter (femur)
**68c.** Lesser trochanter (femur)
**68d.** Intertrochanteric crest (femur)
**68f.** Quadrate line (femur)

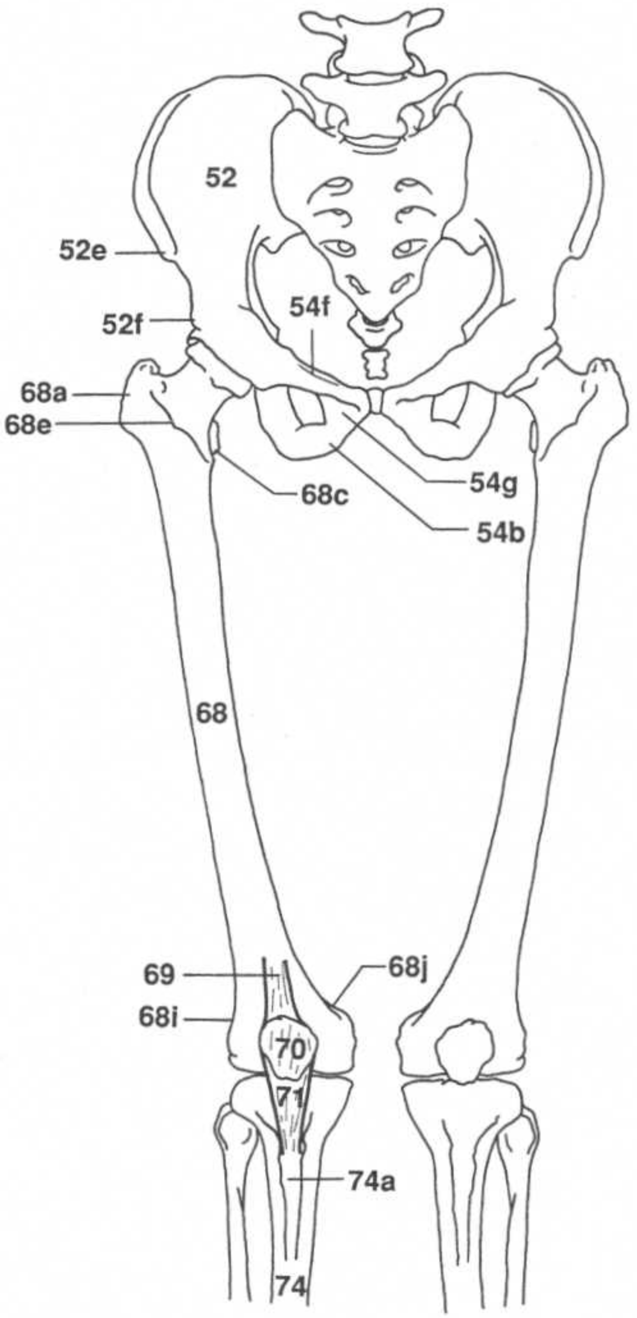
# PELVIC GIRDLE AND UPPER LEG—THREE-QUARTER POSTERIOR VIEW


52b
52j
52k
26
27
52l
55
28
56
53d
68a
68g
68h

**26.** Sacrum
**27.** Aponeurosis of erector spinae
**28.** Coccyx
**52b.** Iliac crest
**52j.** Posterior gluteal line (ilium)
**52k.** Middle (anterior) gluteal line (ilium)
**52l.** Inferior gluteal line (ilium)
**53d.** Lesser sciatic notch
**55.** Greater sciatic notch
**56.** Sacrotuberous ligament
**68a.** Greater trochanter (femur)
**68g.** Gluteal tuberosity (femur)
**68h.** Linea aspera (femur)

# PELVIC GIRDLE TO LEG—ANTERIOR VIEW

**52.** Ilium
**52e.** Anterior superior iliac spine
**52f.** Anterior inferior iliac spine
**54b.** Inferior ramus of pubis
**54f.** Pectineal line (pubis)
**54g.** Body of pubis
**68.** Femur
**68a.** Greater trochanter (femur)
**68c.** Lesser trochanter (femur)
**68e.** Intertrochanteric line (femur)
**68i.** Lateral supracondylar line (femur)
**68j.** Medial supracondylar line (femur)
**69.** Quadriceps tendon
**70.** Patella
**71.** Patellar ligament
**74.** Tibia
**74a.** Tuberosity of tibia


52
52e
54f
52f
68a
68e
68c
54g
54b
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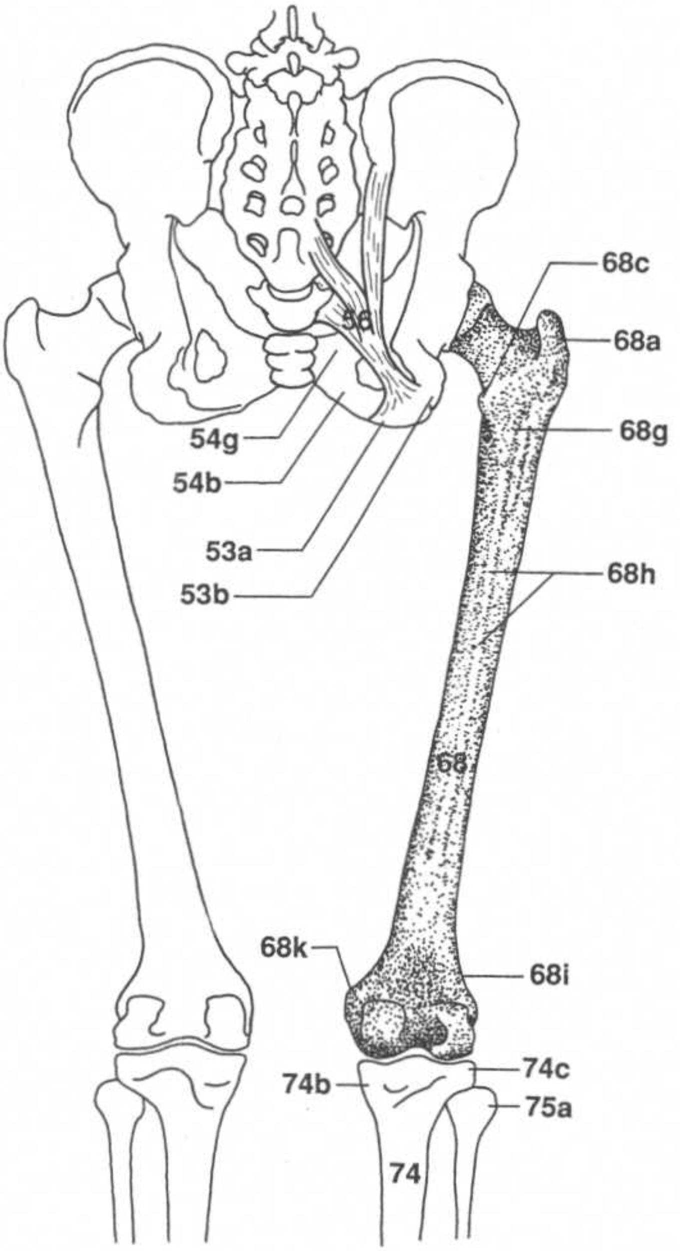
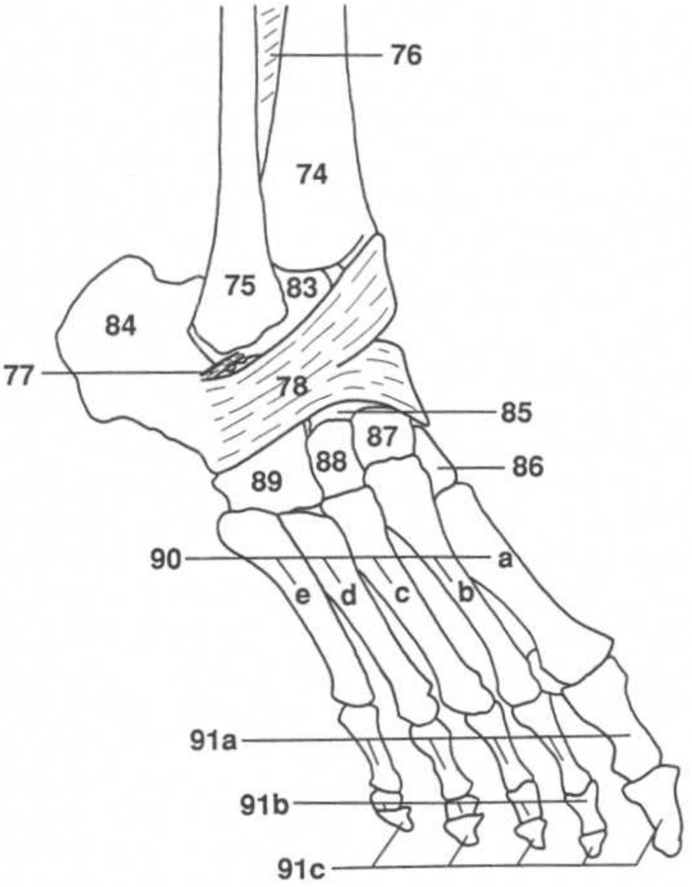
69
68j
68i
70
71
74a
74

# PELVIC GIRDLE TO LEG—POSTERIOR VIEW


68c
68a
56
54g
54b
68g
53a
53b
68h
68
68k
68i
74c
74b
75a
74

**53a.** Ramus of ischium
**53b.** Ischial tuberosity
**54b.** Inferior ramus of pubis
**54g.** Body of pubis
**56.** Sacrotuberous ligament
**68.** Femur
**68a.** Greater trochanter (femur)
**68c.** Lesser trochanter (femur)
**68g.** Gluteal tuberosity (femur)
**68h.** Linea aspera (femur)
**68i.** Lateral supracondylar line (femur)
**68k.** Adductor tubercle (femur)
**74.** Tibia
**74b.** Medial condyle of tibia
**74c.** Lateral condyle of tibia
**75a.** Head of fibula

## RIGHT FOOT—ANTEROLATERAL VIEW


76
74
75
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84
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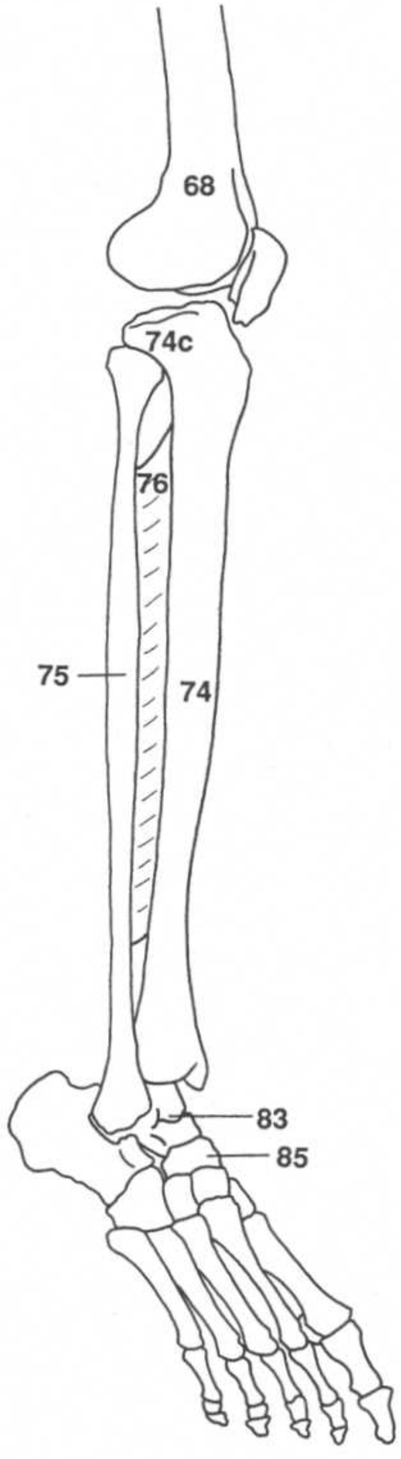
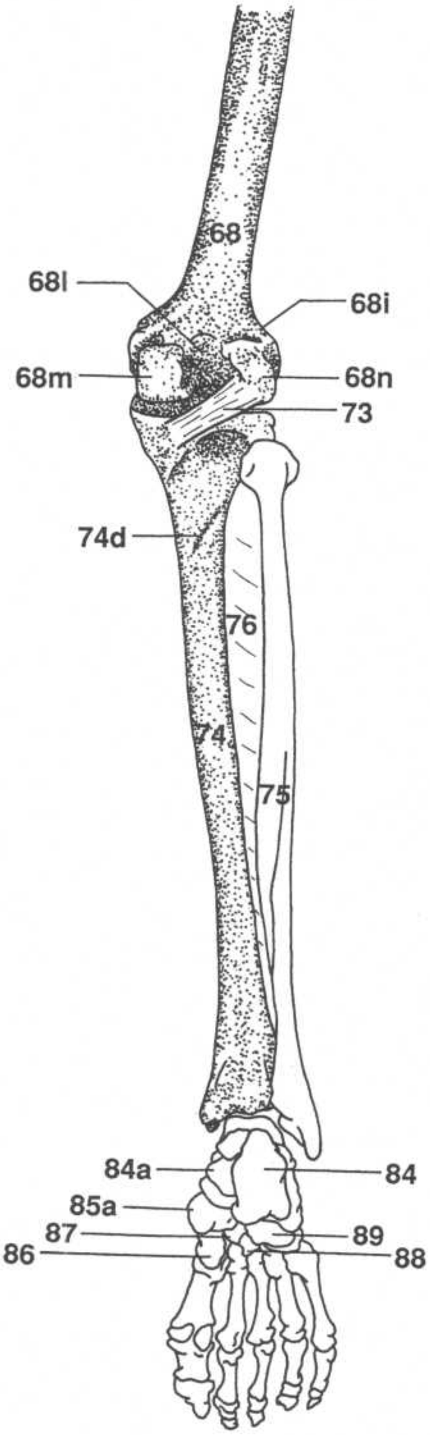
90
a
e
d
c
b
91a
91b
91c

**68.** Femur
**74.** Tibia
**74c.** Lateral condyle of tibia
**75.** Fibula
**76.** Interosseous membrane
**77.** Lateral talocalcaneal ligament
**78.** Inferior extensor retinaculum
**83.** Talus
**84.** Calcaneus
**85.** Navicular
**86.** Medial cuneiform
**87.** Intermediate cuneiform
**88.** Lateral cuneiform
**89.** Cuboid
**90.** Metatarsal bones
**90a.** First metatarsal
**90b.** Second metatarsal
**90c.** Third metatarsal
**90d.** Fourth metatarsal
**90e.** Fifth metatarsal
**91a.** Proximal phalanges
**91b.** Middle phalanges
**91c.** Distal phalanges

## RIGHT LEG—ANTEROLATERAL VIEW

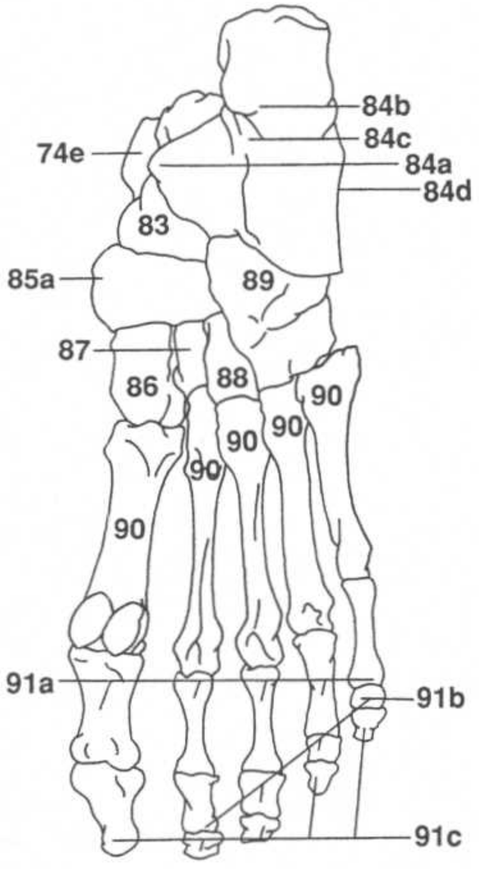

68
74c
76
75
74
83
85

# RIGHT LEG—POSTERIOR VIEW


68
68l
68i
68m
68n
73
74d
76
74
75
84a
84
85a
87
89
86
88

| | |
|---|---|
| **68.** | Femur |
| **68i.** | Lateral supracondylar line (femur) |
| **68l.** | Popliteal surface (femur) |
| **68m.** | Medial condyle (femur) |
| **68n.** | Lateral condyle (femur) |
| **73.** | Oblique popliteal ligament |
| **74.** | Tibia |
| **74d.** | Soleal line (tibia) |
| **75.** | Fibula |
| **76.** | Interosseous membrane |
| **84.** | Calcaneus |
| **84a.** | Sustentaculum tali of calcaneus |
| **85a.** | Tuberosity of navicular |
| **86.** | Medial cuneiform |
| **87.** | Intermediate cuneiform |
| **88.** | Lateral cuneiform |
| **89.** | Cuboid |

# RIGHT FOOT—PLANTAR VIEW


84b
84c
74e
84a
84d
83
85a
89
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86
88
90
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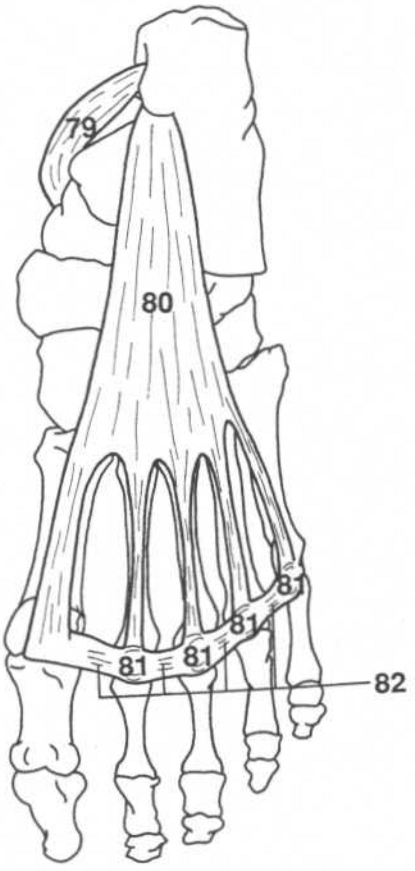
90
91a
91b
91c

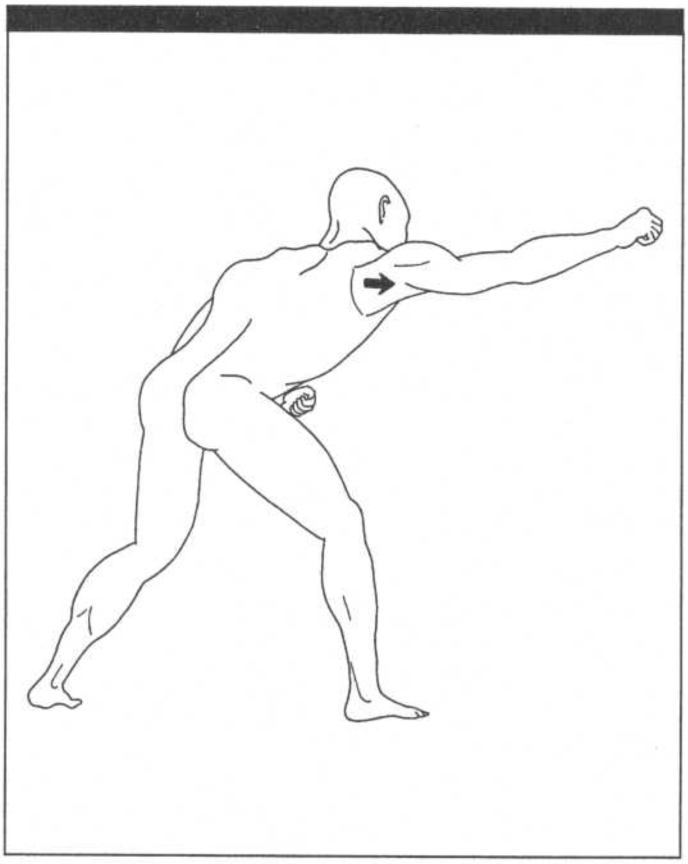

79
80
81
81
81
81
82

**74e.** Medial malleolus of tibia
**79.** Flexor retinaculum
**80.** Plantar aponeurosis
**81.** Plantar metatarsophalangeal ligaments
**82.** Transverse metatarsal ligaments
**83.** Talus
**84a.** Sustentaculum tali of calcaneus
**84b.** Tuberosity of calcaneus
**84c.** Medial border of calcaneus
**84d.** Lateral border of calcaneus

**85a.** Tuberosity of navicular
**86.** Medial cuneiform
**87.** Intermediate cuneiform
**88.** Lateral cuneiform
**89.** Cuboid
**90.** Metatarsal bones
**91a.** Proximal phalanges
**91b.** Middle phalanges
**91c.** Distal phalanges

## CHAPTER TWO

# MOVEMENTS OF THE BODY



Anatomical position—A subject in the anatomical position is standing erect with the head, eyes, and toes facing forward and the arms hanging straight at the sides with the palms of the hands facing forward.

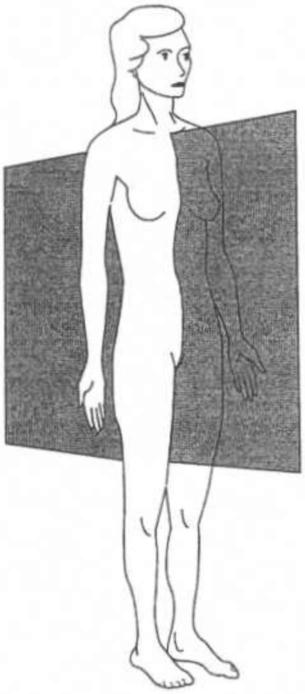


**Figure 2.1**
Median or midsagittal plane—Passes vertically through the body from anterior (front) to posterior (back). It divides the body into right and left sides. Other sagittal planes are parallel to this plane.

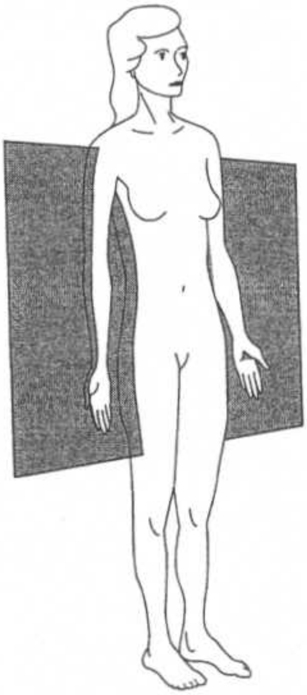


**Figure 2.2**
Coronal (frontal) planes—Pass vertically through the body from side to side. They divide the body from front to back.

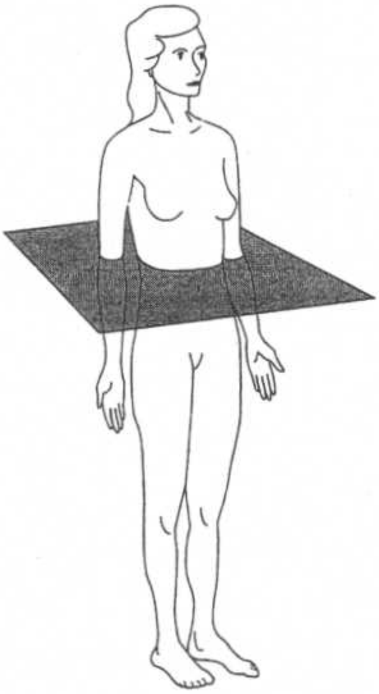


**Figure 2.3**
Transverse planes (cross sections)—Pass horizontally through the body parallel to the ground.

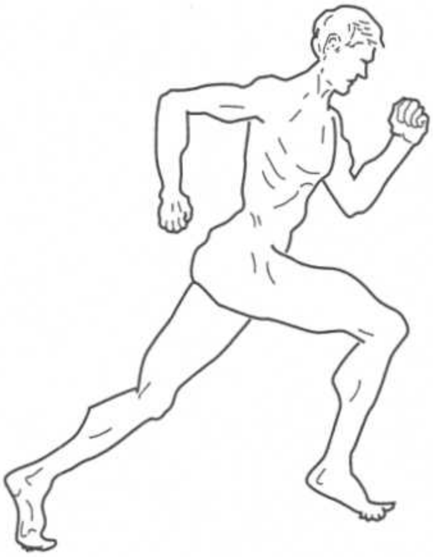


**Figure 2.4**
Flexion—The left arm, forearm, and right thigh are drawn forward in sagittal planes. The right knee is also flexed.
Extension—The left thigh and knee are extended.
Hyperextension—The right arm is hyperextended at the shoulder.

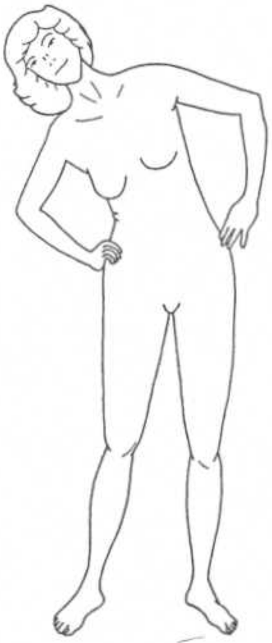


**Figure 2.5**
Lateral flexion—The torso (or head) bends laterally in the coronal plane.

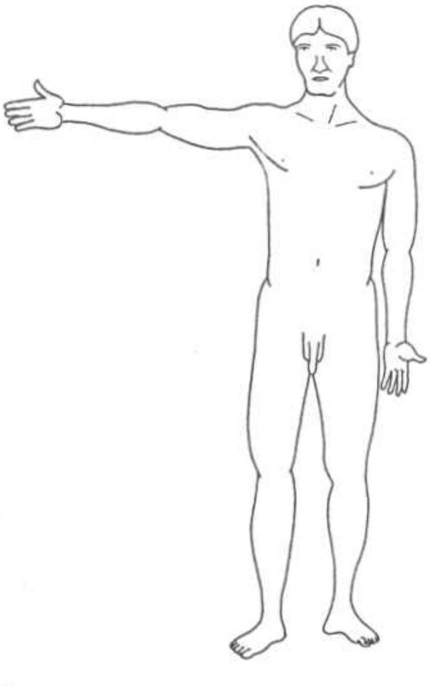


**Figure 2.6**
Abduction—The right arm is drawn laterally in the coronal plane.
Adduction—The left arm is returned from abduction to the anatomical position.

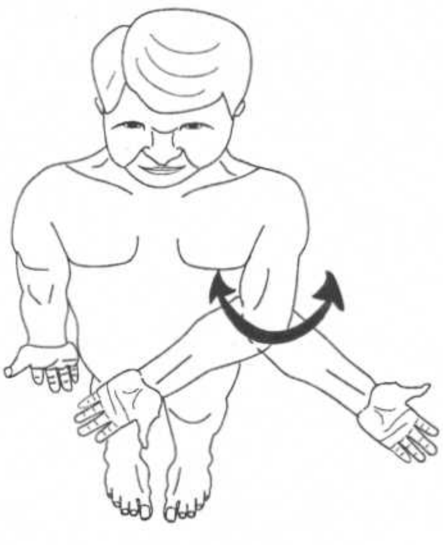


**Figure 2.7**
Medial rotation—The anterior of the arm (or thigh) is moved toward the median plane.
Lateral rotation—The anterior of the arm (or thigh) is moved away from the median plane.

# MOVEMENTS OF THE SCAPULA

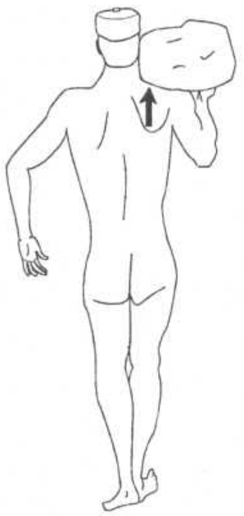


**Figure 2.8**
Elevation—The right scapula of this figure is drawn superiorly.

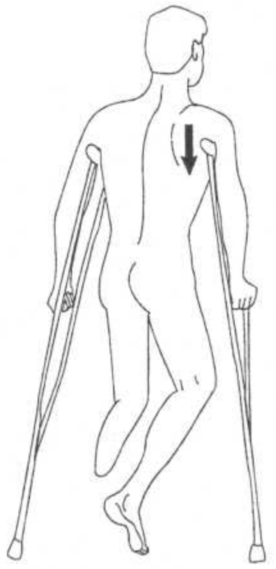


**Figure 2.9**
Depression—The right scapula of this figure is pushing the arm inferiorly.

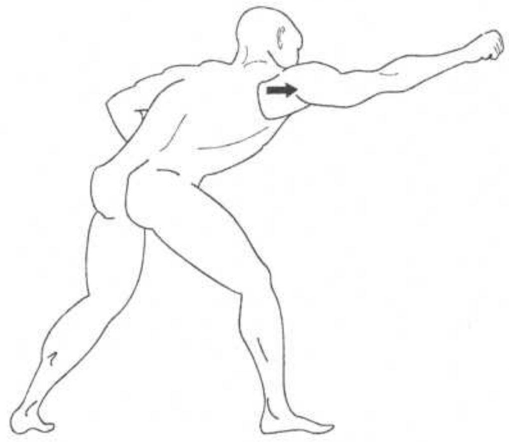


**Figure 2.10**
Protraction—The scapula pushes the arm forward in a sagittal plane.

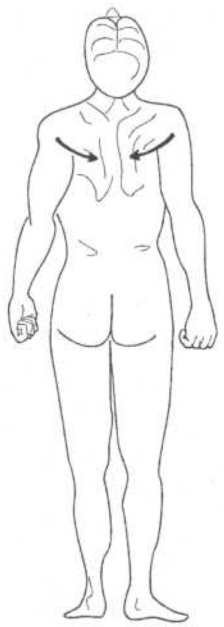


**Figure 2.11**
Retraction—The scapula is pulled back from protraction in a sagittal plane. Since the scapula slides around the ribs toward the median plane, it becomes adduction.

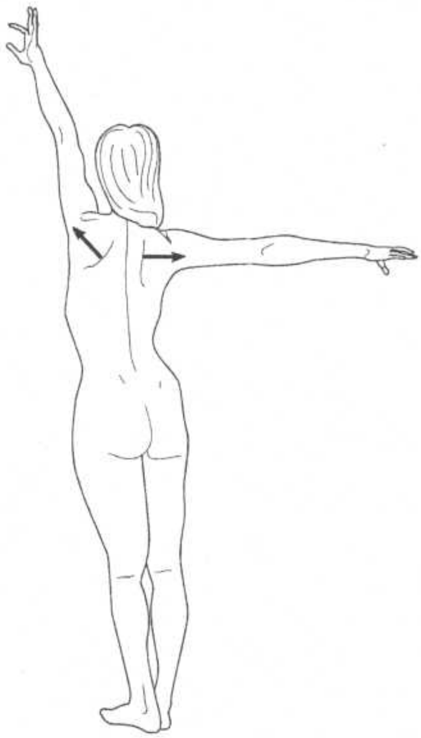


**Figure 2.12**
Rotation—For abduction of the arm to continue above the height of the shoulder, the scapula must rotate on its axis so that the glenoid fossa turns upward.

# MOVEMENTS OF THE HAND AND FOREARM

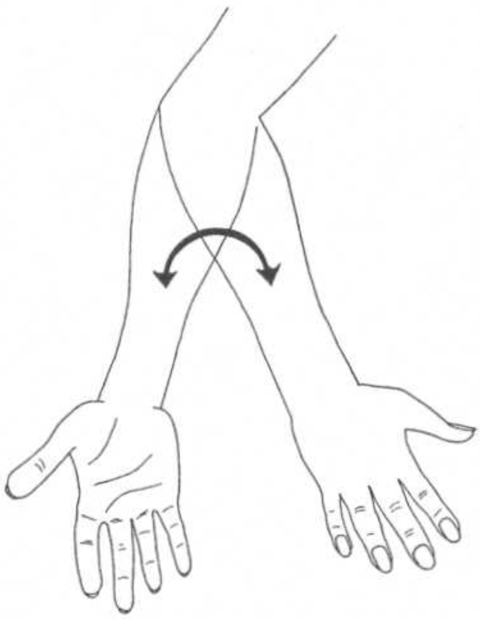


**Figure 2.13**
Pronation—The forearm is rotated away from the anatomical position so that the palm turns medially then posteriorly. If the forearm is flexed at the elbow, then the palm turns inferiorly.
Supination—The forearm is rotated so that the palm turns anteriorly (or superiorly if the forearm is flexed).

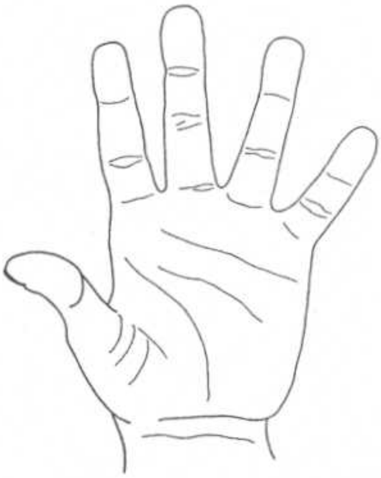


**Figure 2.14**
Abduction—The fingers are moved away from the midline of the hand.

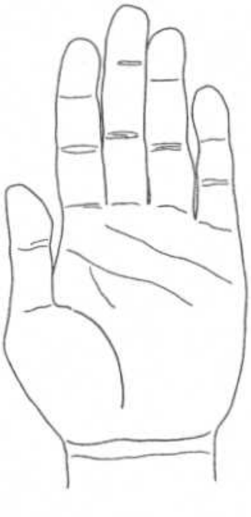


**Figure 2.16**
Adduction—The fingers are moved toward the midline of the hand.

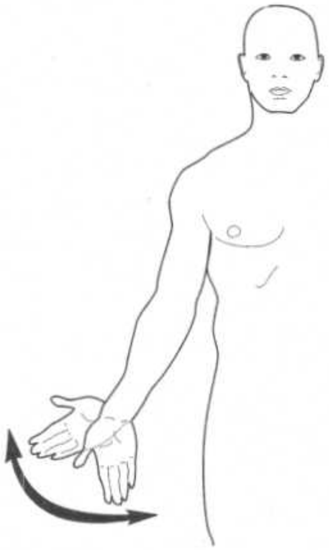


**Figure 2.15**
Radial flexion (abduction)—The hand, at the wrist, is drawn away from the body in a coronal plane.
Ulnar flexion (adduction)—The hand, at the wrist, is drawn toward the body in a coronal plane.

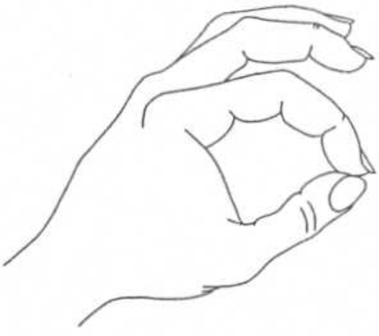


**Figure 2.17**
Opposition—The thumb is rotated so its anterior pad can touch the anterior pads of the four fingers.

# MOVEMENTS OF THE FOOT

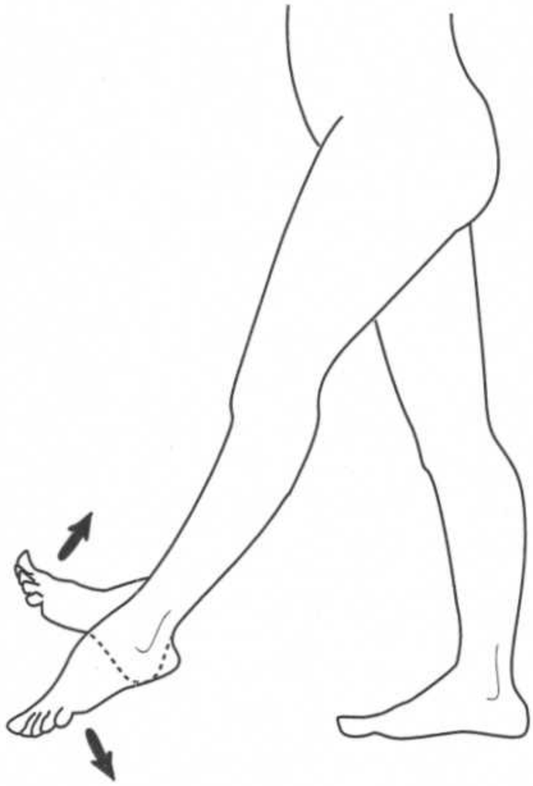


**Figure 2.18**
Dorsiflexion—The ankle flexes, moving the foot superiorly.
Plantar Flexion—The ankle extends, moving the foot inferiorly.

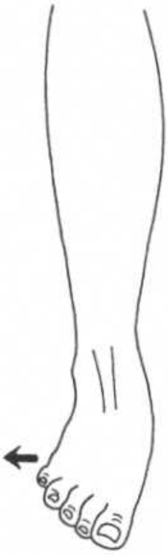


**Figure 2.19**
Eversion—The front of the foot moves laterally away from the midline (abduction), and the sole turns outward.

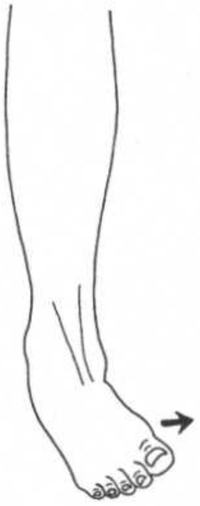
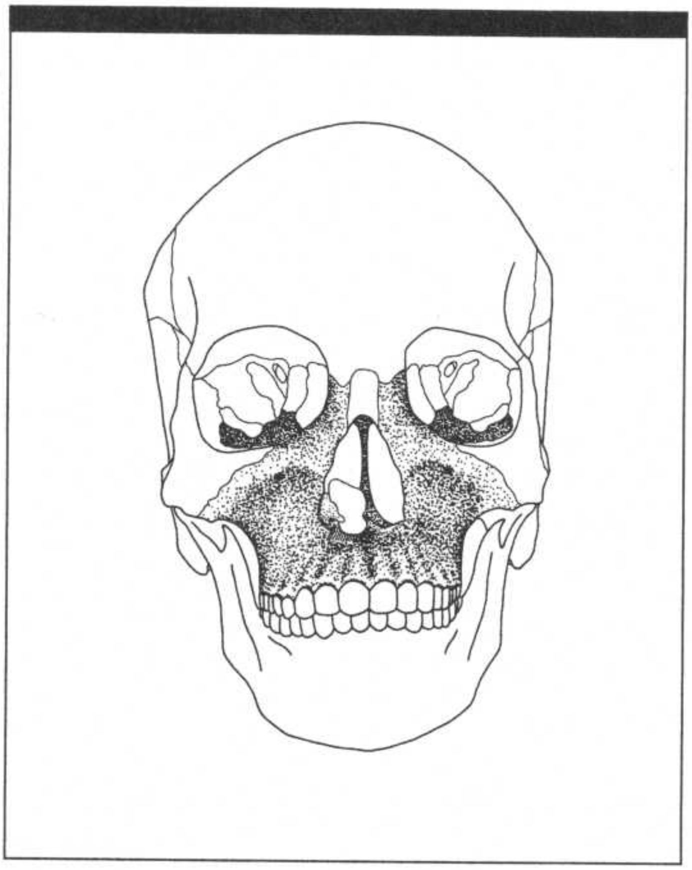
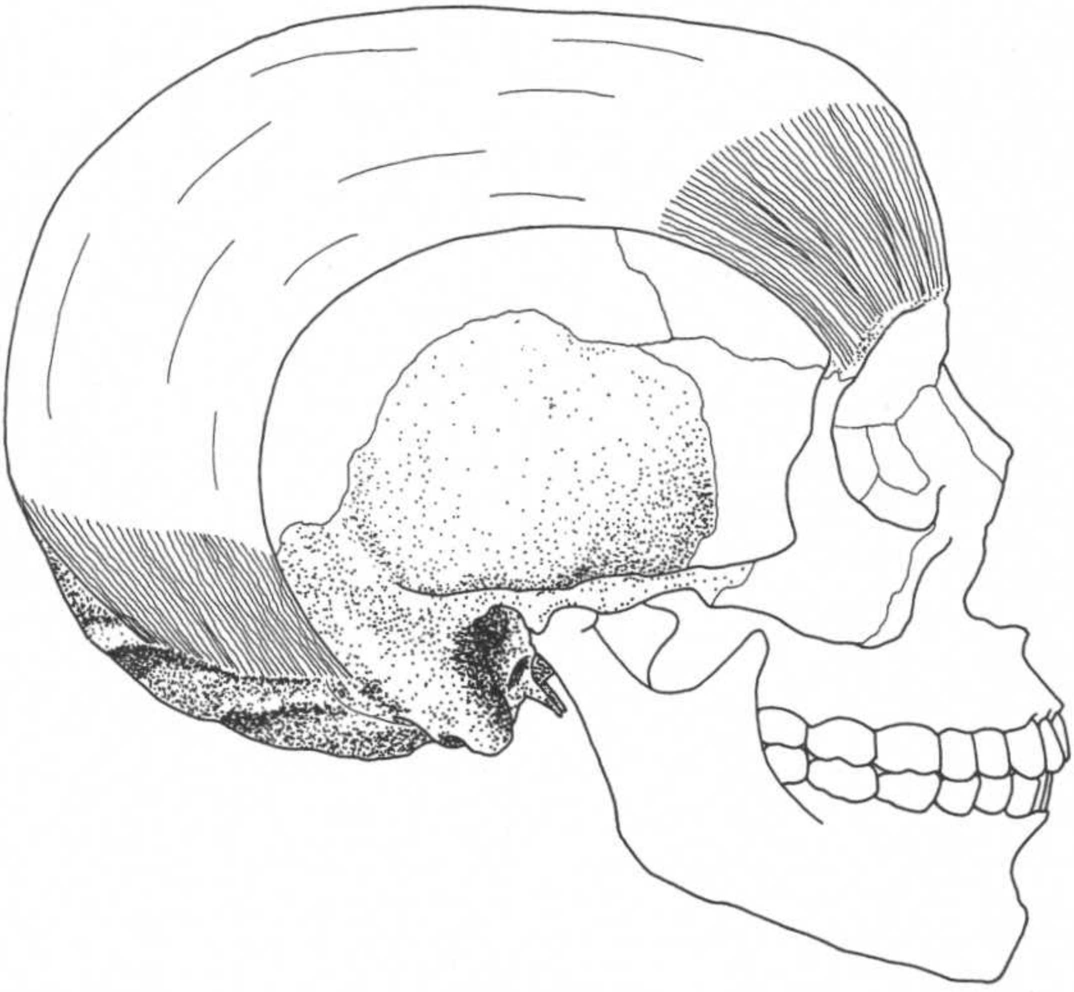


**Figure 2.20**
Inversion—The front of the foot moves medially toward the midline (adduction), and the sole turns inward.

## CHAPTER THREE
# MUSCLES OF THE FACE AND HEAD



# EPICRANIUS

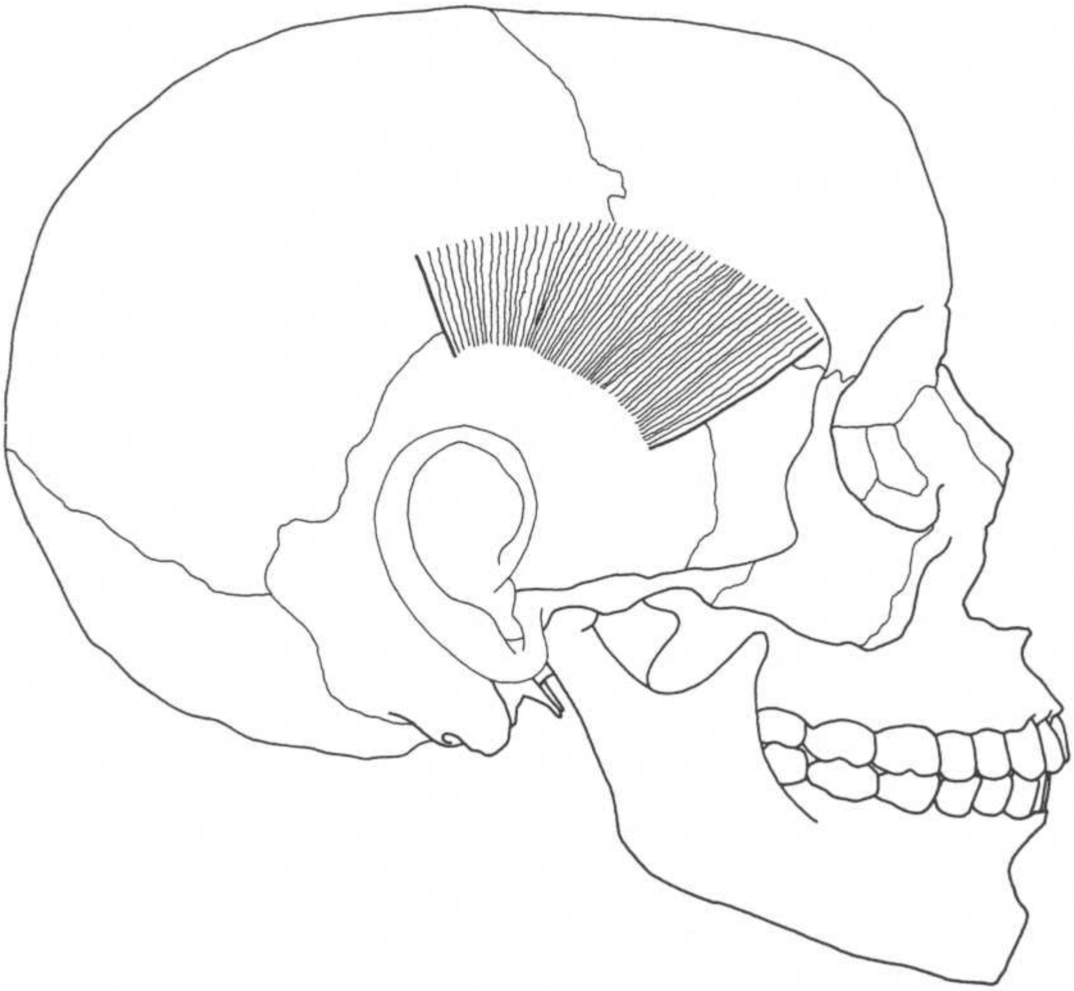


**Skull—lateral view**

| **Occipital belly** | *(occipitalis)* |
|---|---|
| **Origin** | Lateral two-thirds of superior nuchal line of occipital bone, mastoid process of temporal bone |
| **Insertion** | Galea aponeurotica (an intermediate tendon leading to frontal belly) |
| **Action** | Draws back scalp, aids frontal belly to wrinkle forehead and raise eyebrows |
| **Nerve** | Posterior auricular branch of facial nerve |

| **Frontal belly** | *(frontalis)* |
|---|---|
| **Origin** | Galea aponeurotica |
| **Insertion** | Fascia of facial muscles and skin above nose and eyes |
| **Action** | Draws back scalp, wrinkles forehead, raises eyebrows |
| **Nerve** | Temporal branches of facial nerve |

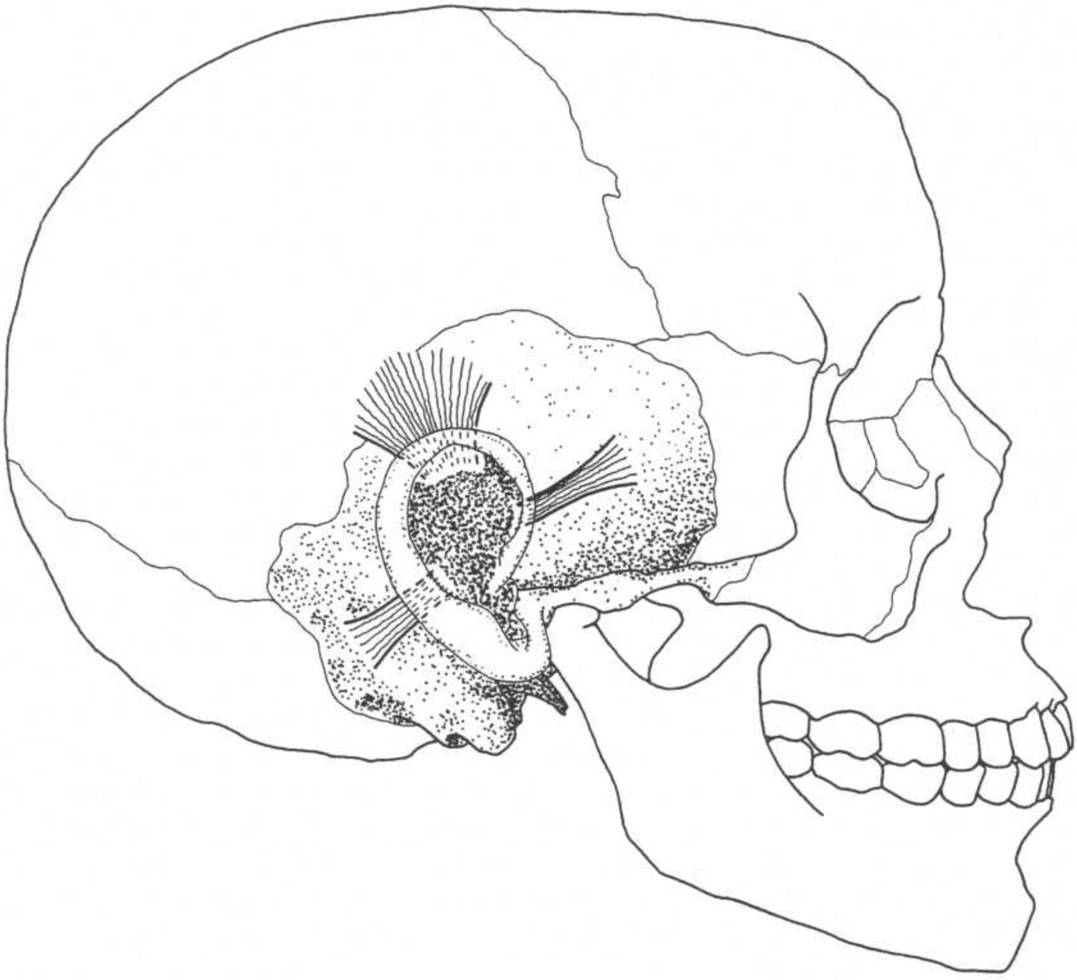
# TEMPOROPARIETALIS



Skull—lateral view

|  |  |  |  |
|---|---|---|---|
| **Origin** | Fascia over ear | **Action** | Raises ears, tightens scalp |
| **Insertion** | Lateral border of galea aponeurotica | **Nerve** | Temporal branch of facial nerve |

# AURICULARIS ANTERIOR, SUPERIOR, POSTERIOR



**Skull—lateral view**

### Auricularis anterior

| | |
|---|---|
| **Origin** | Fascia in temporal region |
| **Insertion** | Anterior to helix of ear |
| **Action** | Draws ear forward in some individuals, moves scalp* |
| **Nerve** | Temporal branch of facial nerve |

### Auricularis superior

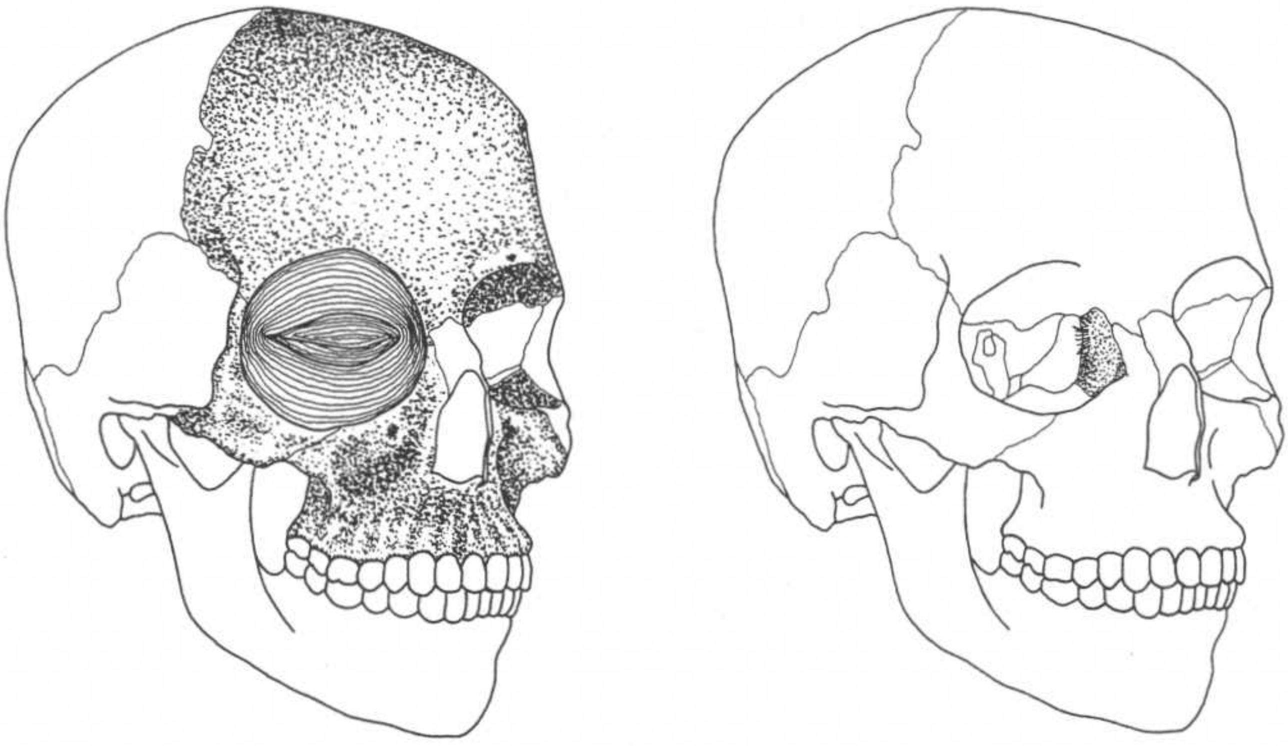
| | |
|---|---|
| **Origin** | Fascia in temporal region |
| **Insertion** | Superior part of ear |
| **Action** | Draws ear upward in some individuals, moves scalp* |
| **Nerve** | Temporal branch of facial nerve |

### Auricularis posterior

| | |
|---|---|
| **Origin** | Mastoid area of temporal bone |
| **Insertion** | Posterior part of ear |
| **Action** | Draws ear upward in some individuals* |
| **Nerve** | Posterior auricular branch of facial nerve |

*This muscle is nonfunctional in most people.

# ORBICULARIS OCULI



**ORBITAL AND PALPEBRAL PARTS**

**LACRIMAL PART**

**Skull—three-quarter anterior view**

**Orbital part**

| | |
|---|---|
| **Origin** | Frontal bone, maxilla (medial margin of orbit) |
| **Insertion** | Continues around orbit and returns to origin |
| **Action** | Strong closure of eyelids |
| **Nerve** | Temporal and zygomatic branches of facial nerve |

**Palpebral part** *(in eyelids)*

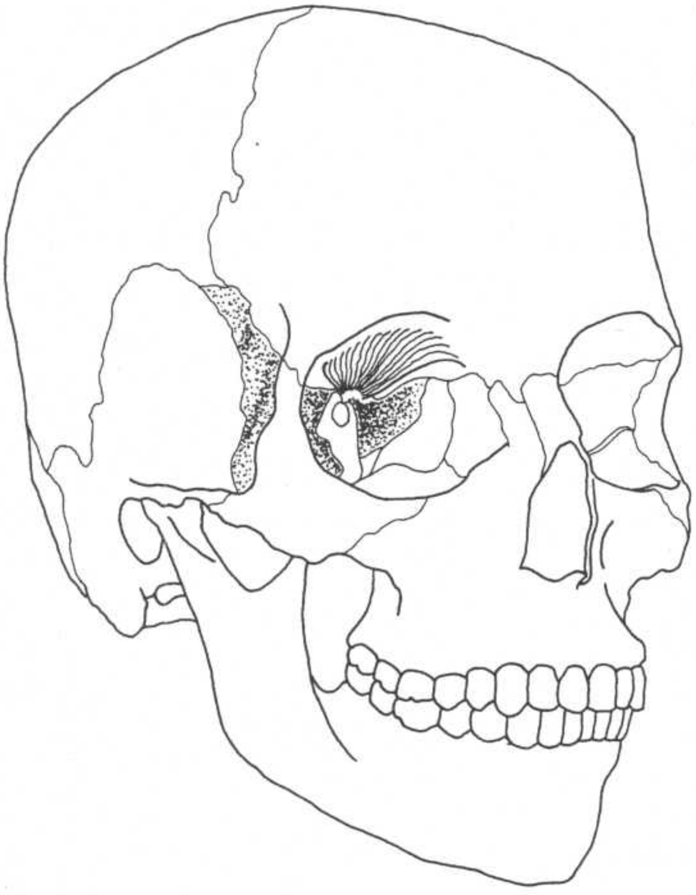
| | |
|---|---|
| **Origin** | Medial palpebral ligament |
| **Insertion** | Lateral palpebral ligament into zygomatic bone |
| **Action** | Gentle closure of eyelids |
| **Nerve** | Temporal and zygomatic branches of facial nerve |

**Lacrimal part** *(behind medial palpebral ligament and lacrimal sac)*

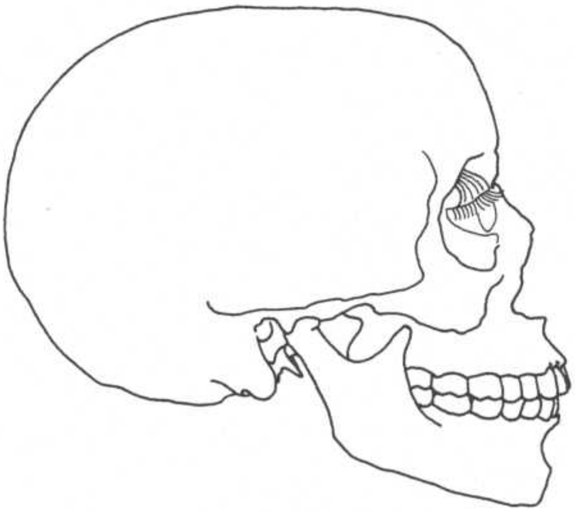
| | |
|---|---|
| **Origin** | Lacrimal bone |
| **Insertion** | Lateral palpebral raphe |
| **Action** | Draws lacrimal canals onto surface of eye |
| **Nerve** | Temporal and zygomatic branches of facial nerve |

# LEVATOR PALPEBRAE SUPERIORIS

| | |
|---|---|
| **Origin** | Inferior surface of lesser wing of sphenoid |
| **Insertion** | Skin of upper eyelid |
| **Action** | Raises upper eyelid |
| **Nerve** | Oculomotor nerve |

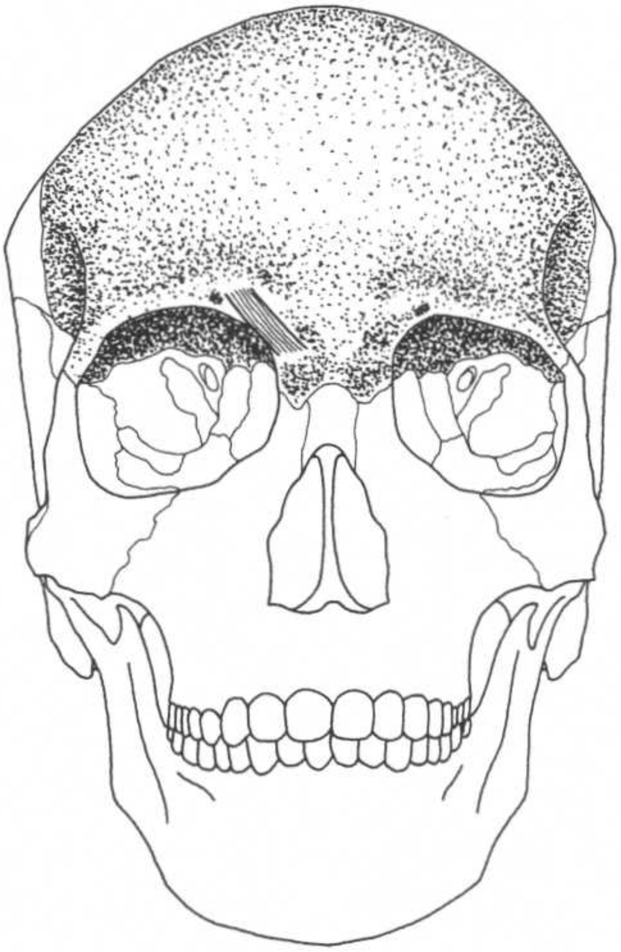


**Skull—three-quarter anterior view**



**Skull—lateral view**

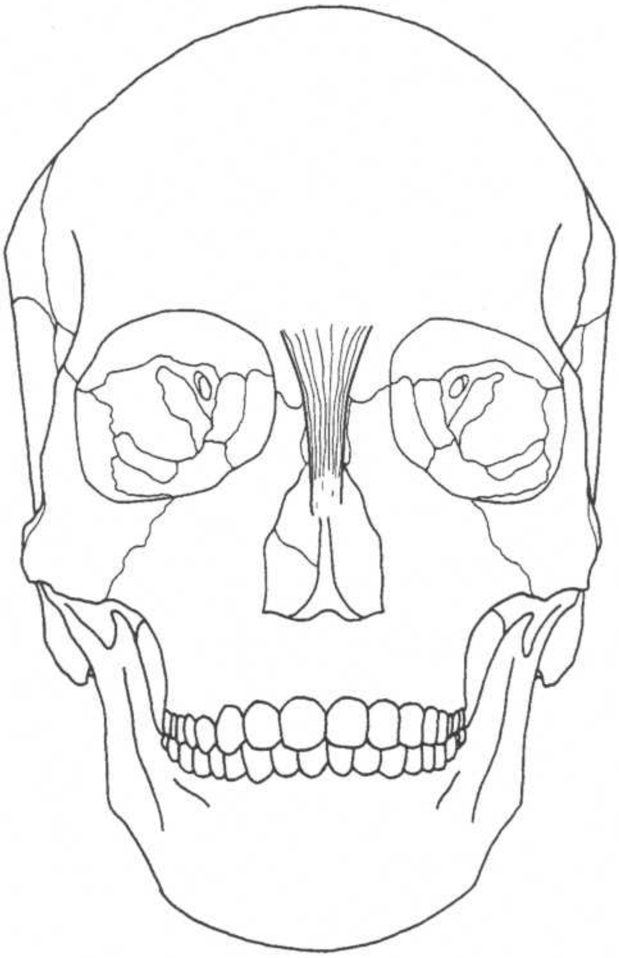
# CORRUGATOR SUPERCILII



**Skull—anterior view**

| | |
|---|---|
| **Origin** | Medial end of superciliary arch |
| **Insertion** | Deep surface of skin under medial portion of eyebrows |
| **Action** | Draws eyebrows downward and medially |
| **Nerve** | Temporal branch of facial nerve |

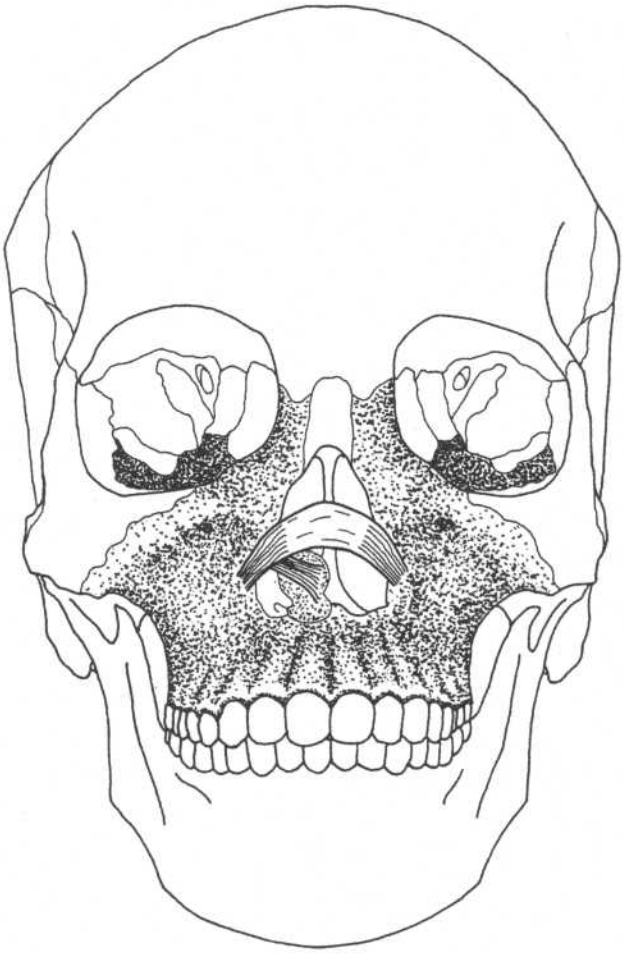
# PROCERUS



Skull—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Fascia over nasal bone and lateral nasal cartilage | **Action** | Draws down medial part of eyebrows, wrinkles nose |
| **Insertion** | Skin between eyebrows | **Nerve** | Buccal branches of facial nerve |

# NASALIS



**Skull—anterior view**

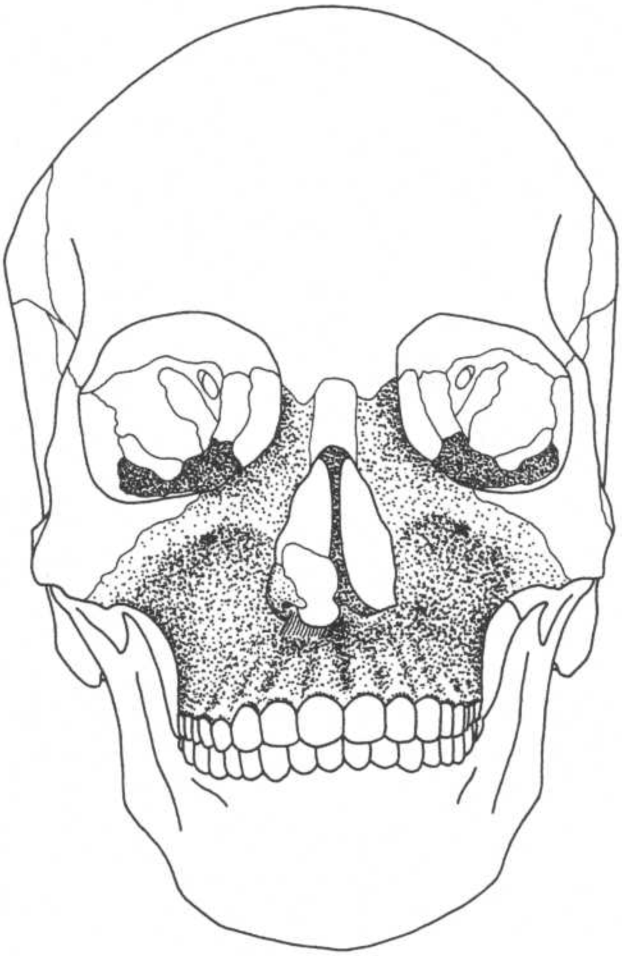
**Transverse part**

| | |
|---|---|
| **Origin** | Middle of maxilla |
| **Insertion** | Muscle of opposite side over bridge of nose |

**Alar part**

| | |
|---|---|
| **Origin** | Greater alar cartilage, skin on nose |
| **Insertion** | Skin at point of nose |
| **Action** | Both parts maintain opening of external nares during forceful inspiration |
| **Nerve** | Buccal branches of facial nerve |

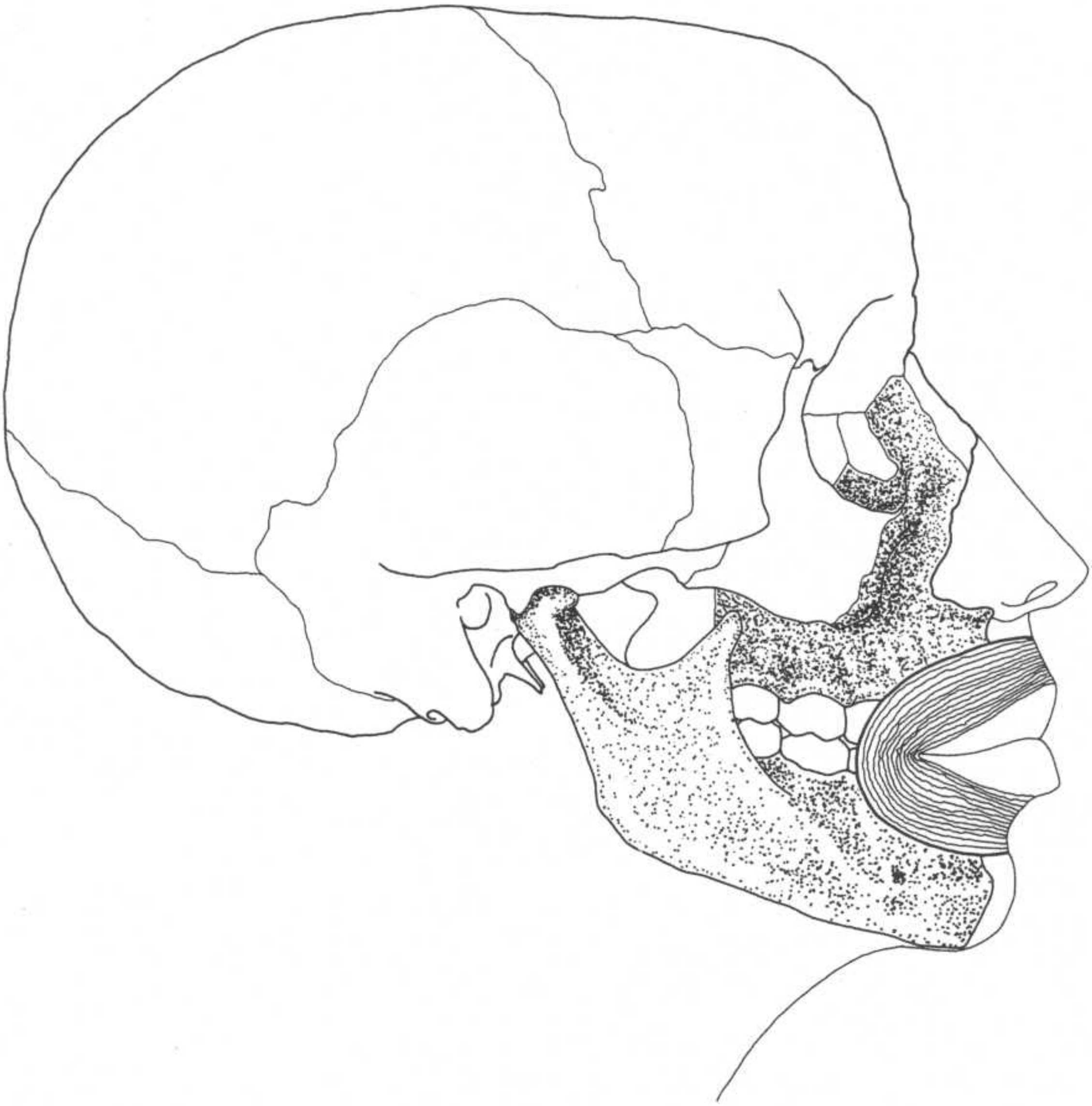
# DEPRESSOR SEPTI



Skull—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Incisive fossa of maxilla | **Action** | Constricts nares |
| **Insertion** | Nasal septum and ala | **Nerve** | Buccal branches of facial nerve |

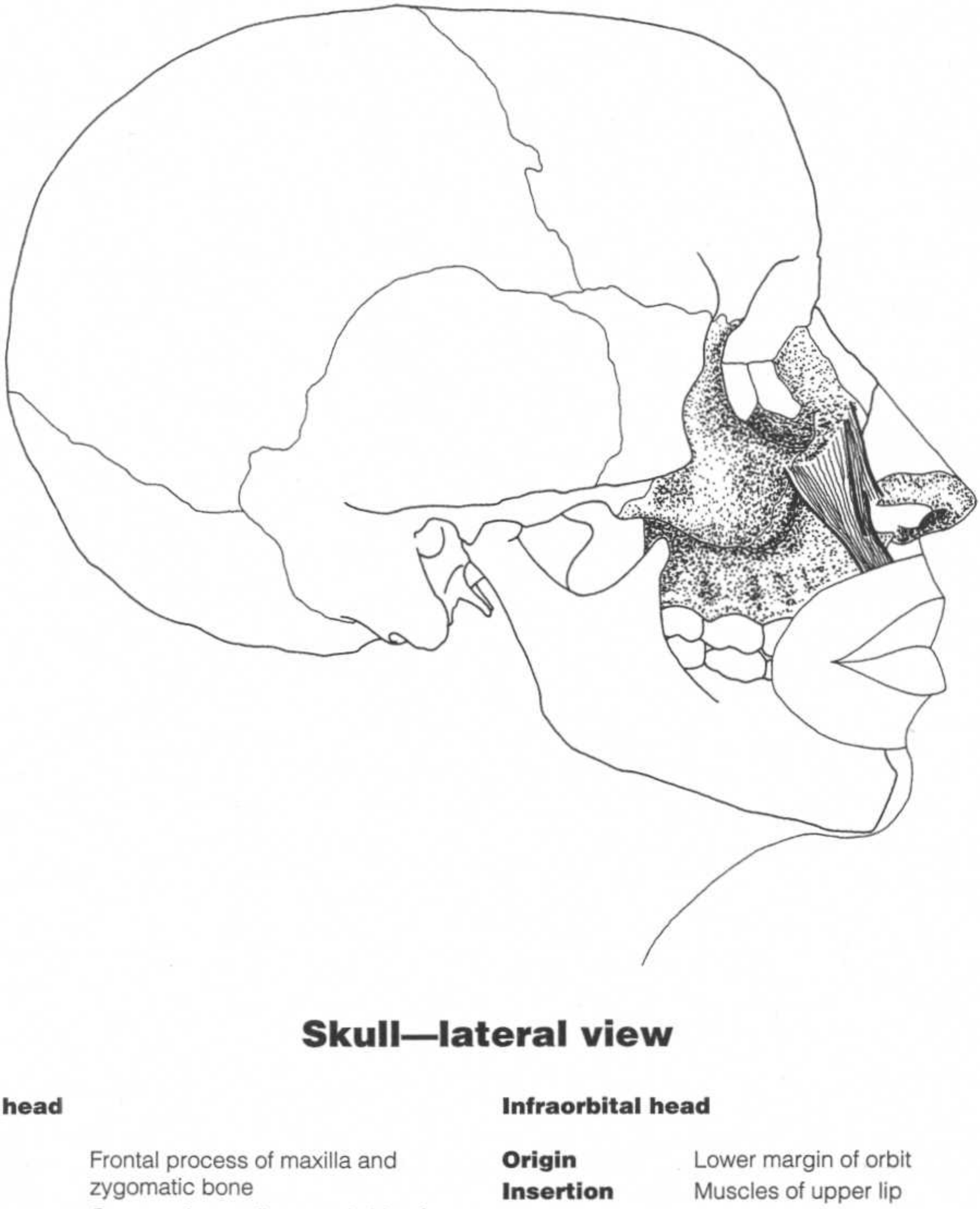
# ORBICULARIS ORIS



## Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Lateral band—alveolar border of maxilla<br>Medial band—septum of nose<br>Inferior portion—lateral to midline of mandible | **Insertion** | Becomes continuous with other muscles at angle of mouth |
| | | **Action** | Closure and protrusion of lips |
| | | **Nerve** | Buccal and mandibular branches of facial nerve |

# LEVATOR LABII SUPERIORIS



Skull—lateral view

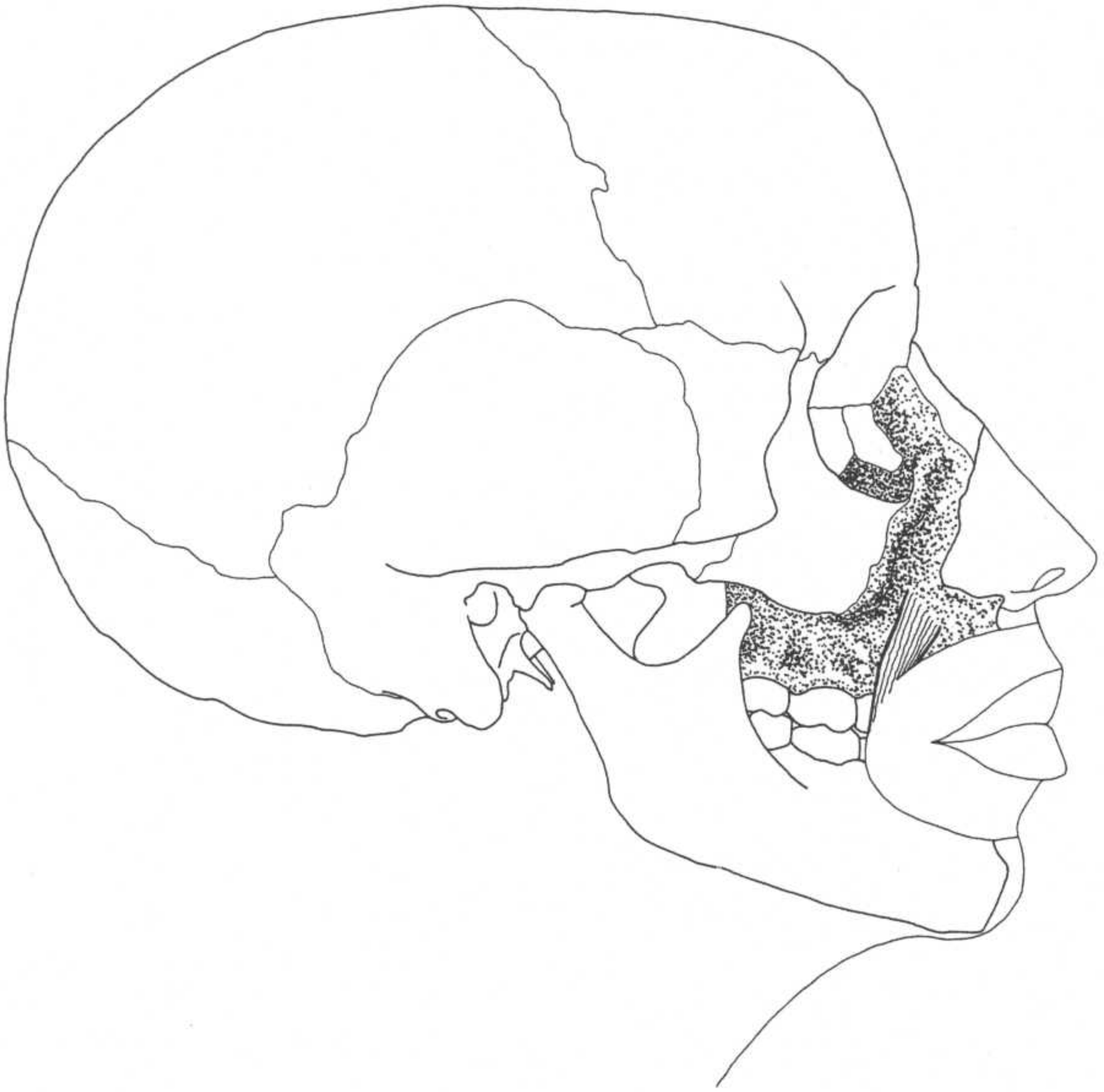
**Angular head**

| | |
|---|---|
| **Origin** | Frontal process of maxilla and zygomatic bone |
| **Insertion** | Greater alar cartilage and skin of nose, upper lip |
| **Action** | Elevates upper lip, dilates nares, forms nasolabial furrow |
| **Nerve** | Buccal branches of facial nerve |

**Infraorbital head**

| | |
|---|---|
| **Origin** | Lower margin of orbit |
| **Insertion** | Muscles of upper lip |
| **Action** | Elevates upper lip |
| **Nerve** | Buccal branches of facial nerve |

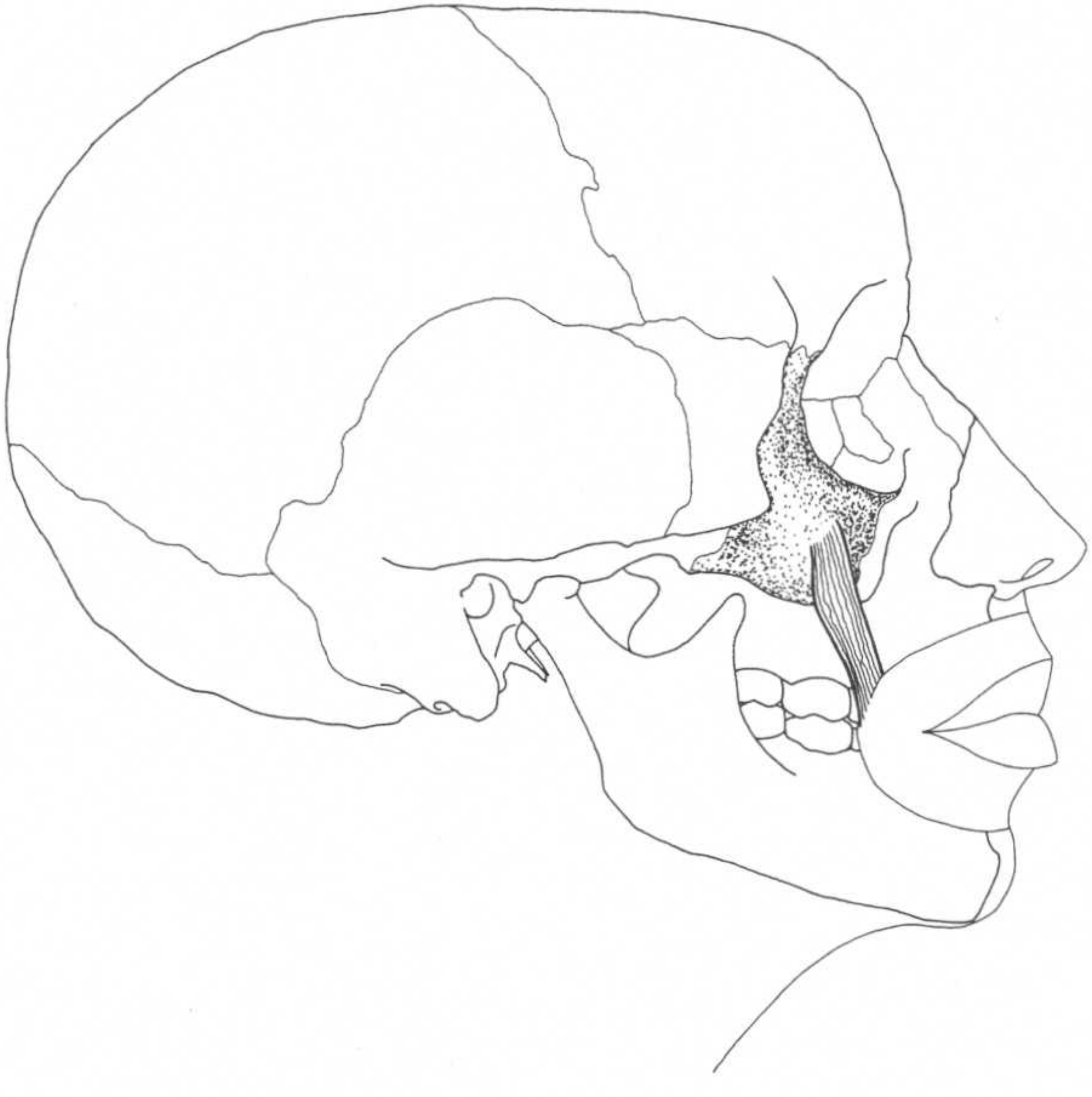
# LEVATOR ANGULI ORIS



**Skull—lateral view**

| | | | |
|---|---|---|---|
| **Origin** | Canine fossa of maxilla | **Action** | Elevates corner (angle) of mouth |
| **Insertion** | Angle of mouth | **Nerve** | Buccal branches of facial nerve |

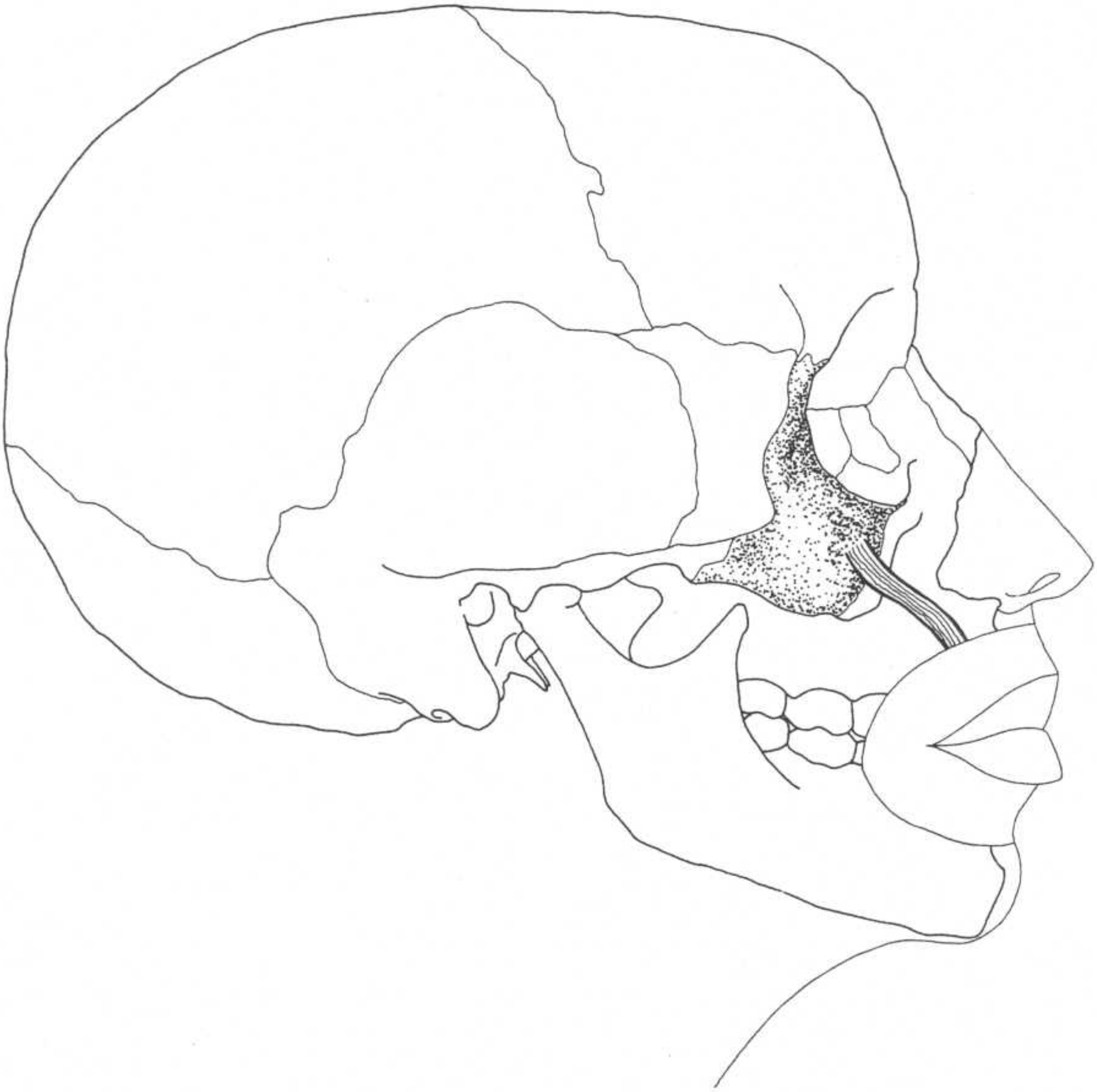
# ZYGOMATICUS MAJOR



## Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Zygomatic bone | **Action** | Draws angle of mouth upward and backward (laughing) |
| **Insertion** | Angle of mouth | **Nerve** | Buccal branches of facial nerve |

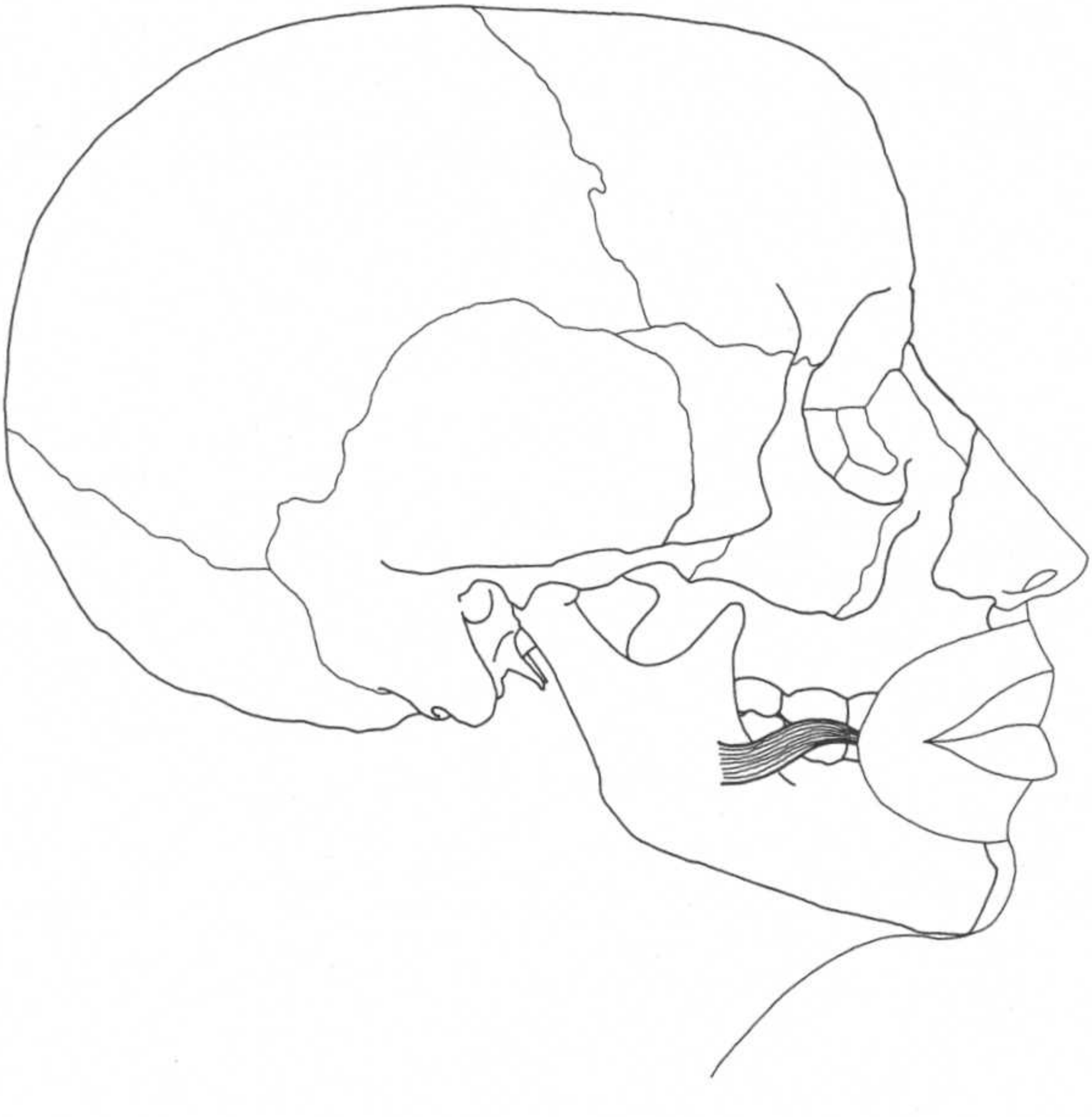
# ZYGOMATICUS MINOR



Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Zygomatic bone | **Action** | Forms nasolabial furrow |
| **Insertion** | Upper lip lateral to levator labii superioris | **Nerve** | Buccal branches of facial nerve |

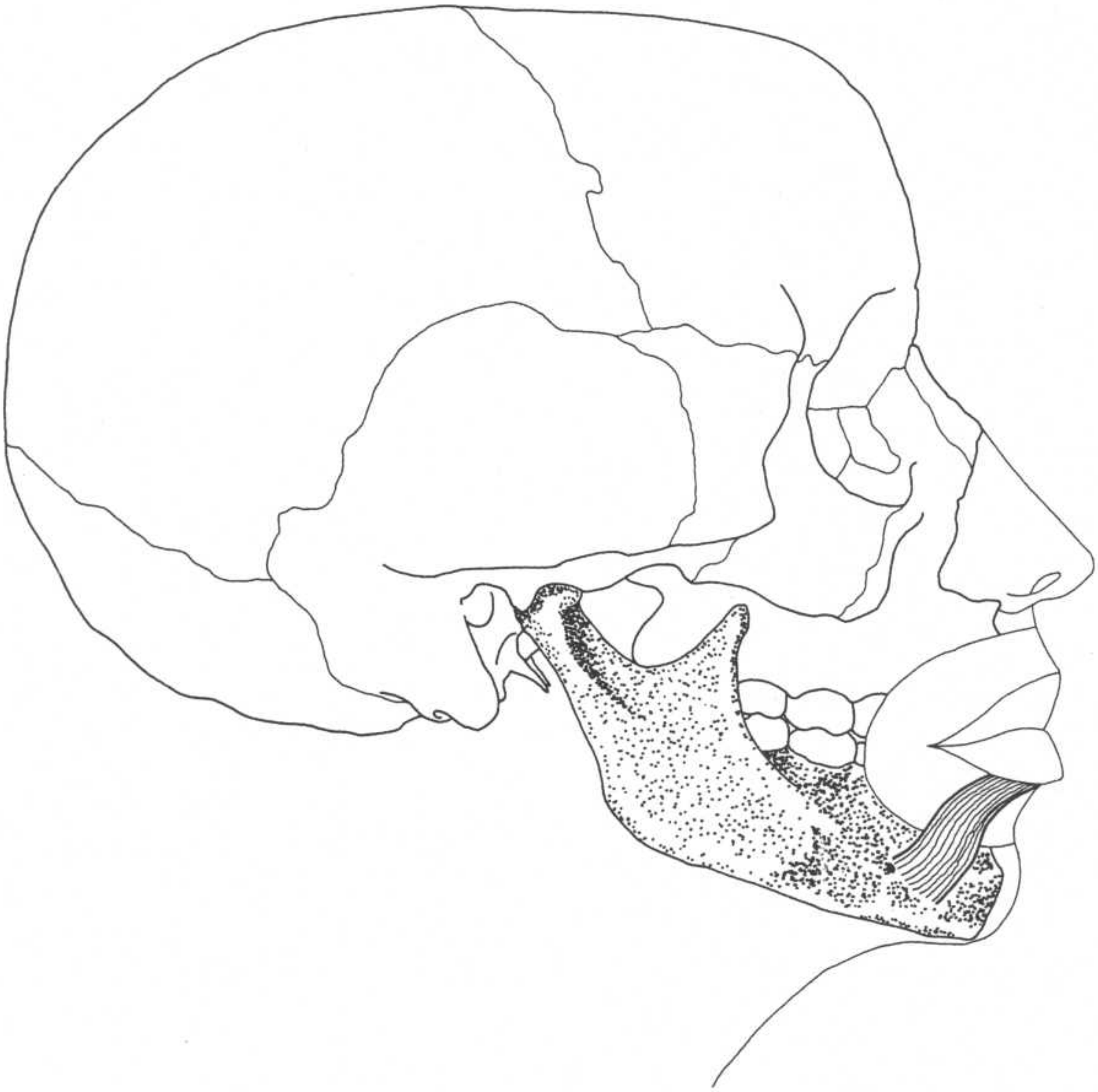
# RISORIUS



## Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Fascia over masseter | **Action** | Retracts angle of mouth, as in grinning |
| **Insertion** | Skin at angle of mouth | **Nerve** | Buccal branches of facial nerve |

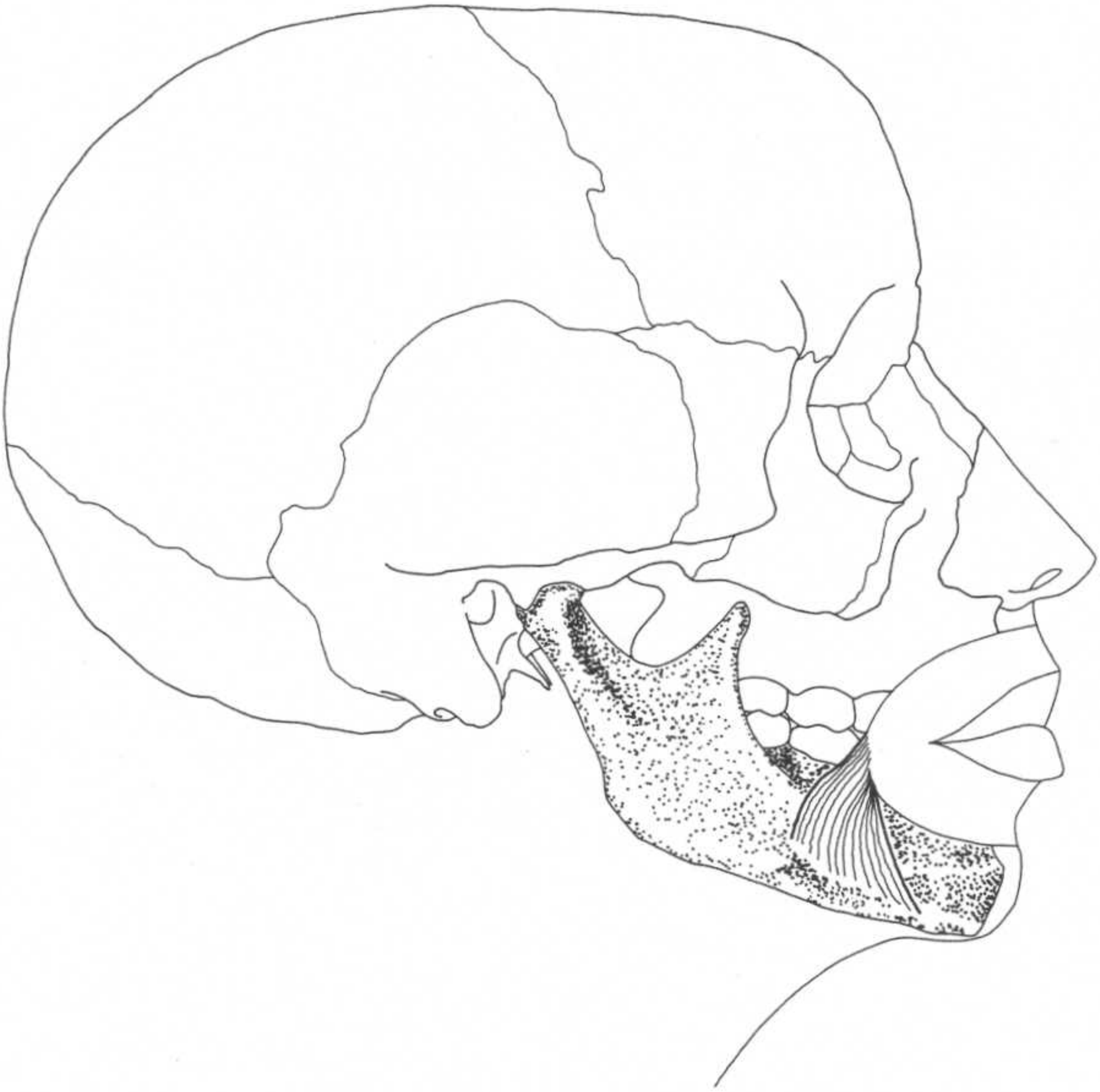
# DEPRESSOR LABII INFERIORIS



Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Mandible, between symphysis and mental foramen | **Action** | Draws lower lip downward and laterally |
| **Insertion** | Skin of lower lip | **Nerve** | Mandibular branch of facial nerve |

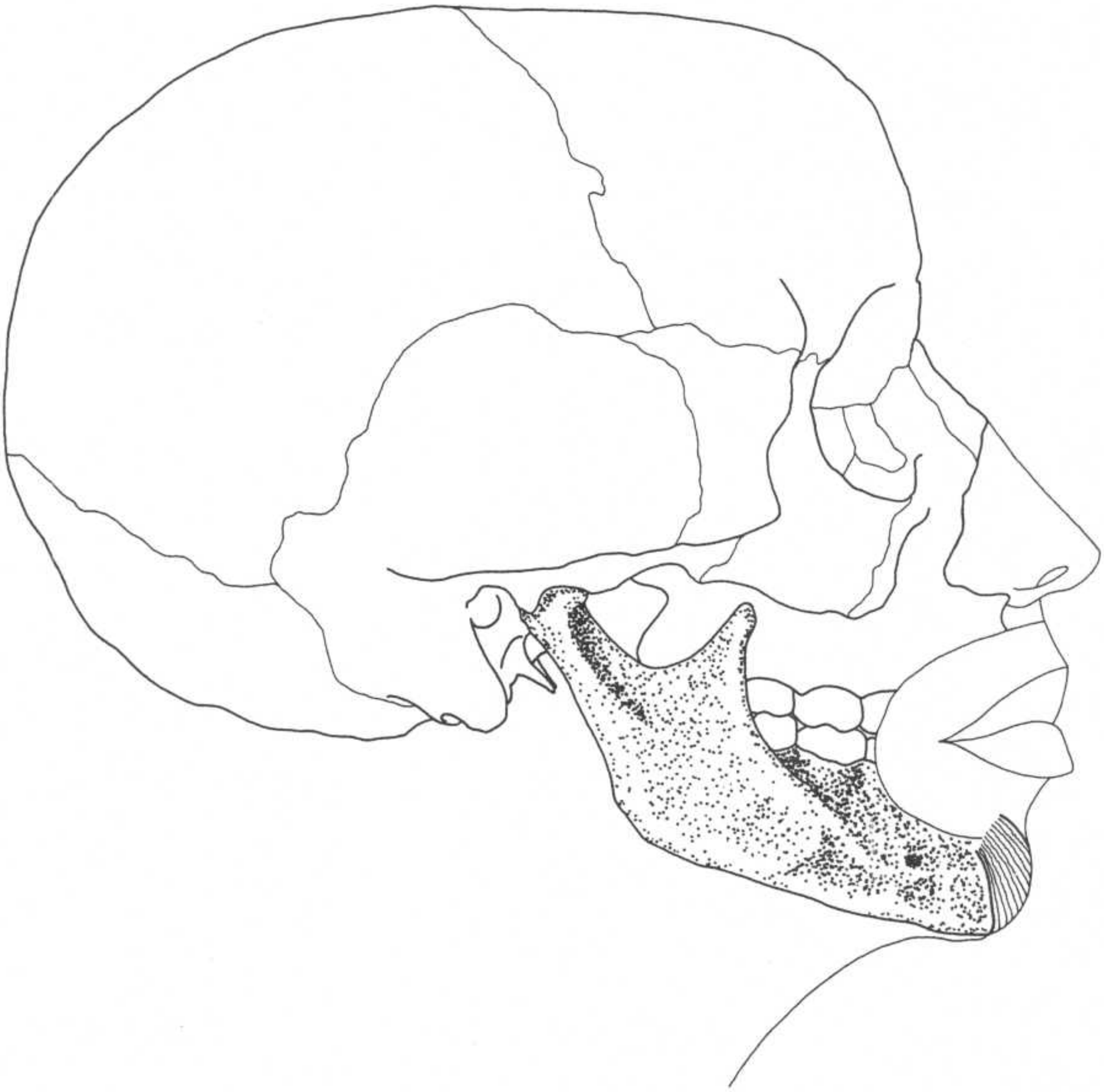
# DEPRESSOR ANGULI ORIS



**Skull—lateral view**

| | |
|---|---|
| **Origin** | Oblique line of the mandible |
| **Insertion** | Angle of the mouth |
| **Action** | Depresses angle of mouth, as in frowning |
| **Nerve** | Mandibular branch of facial nerve |

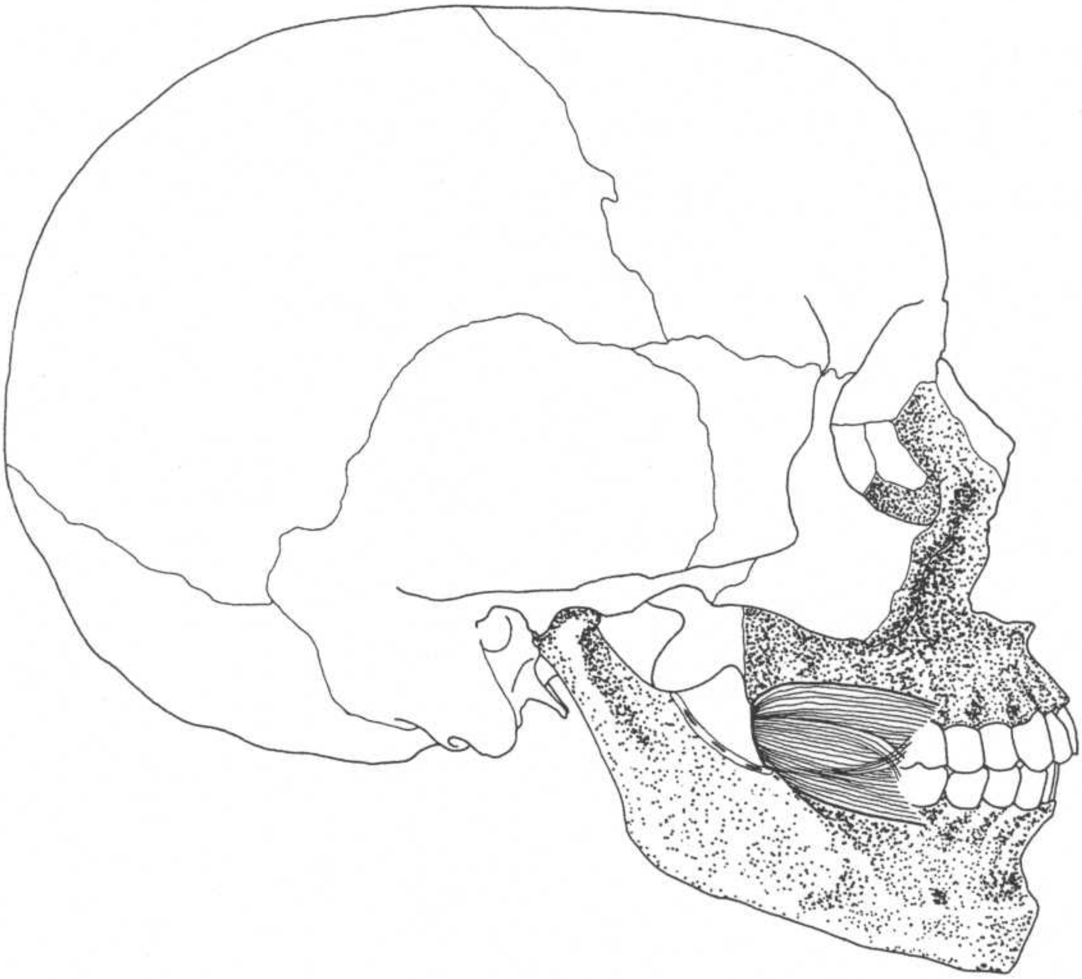
# MENTALIS



Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Incisive fossa of mandible | **Action** | Raises and protrudes lower lip, wrinkles skin of chin |
| **Insertion** | Skin of chin | **Nerve** | Mandibular branch of facial nerve |

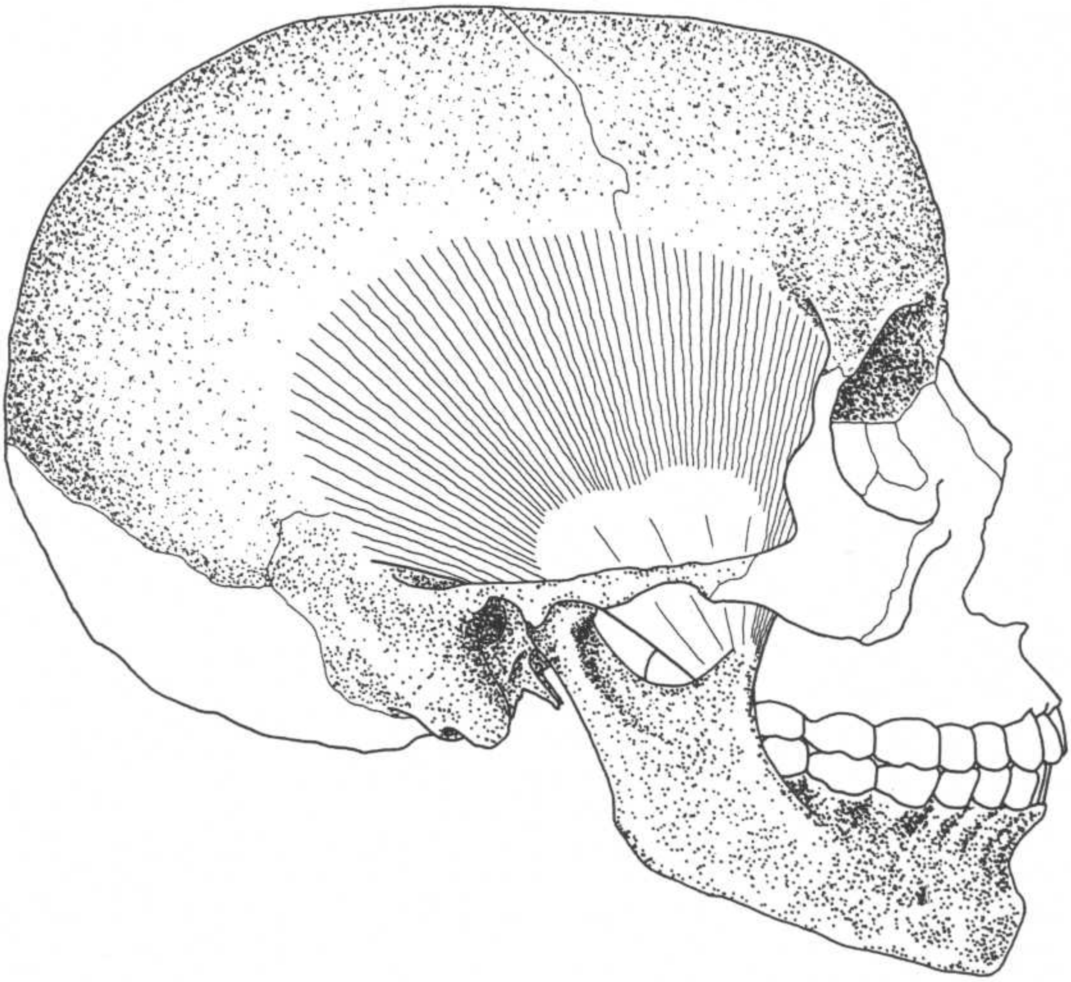
# BUCCINATOR



**Skull—lateral view**

| | |
|---|---|
| **Origin** | Outer surface of alveolar processes of maxilla and mandible over molars and along pterygomandibular raphe |
| **Insertion** | Deep part of muscles of lips |
| **Action** | Compresses cheek |
| **Nerve** | Buccal branches of facial nerve |

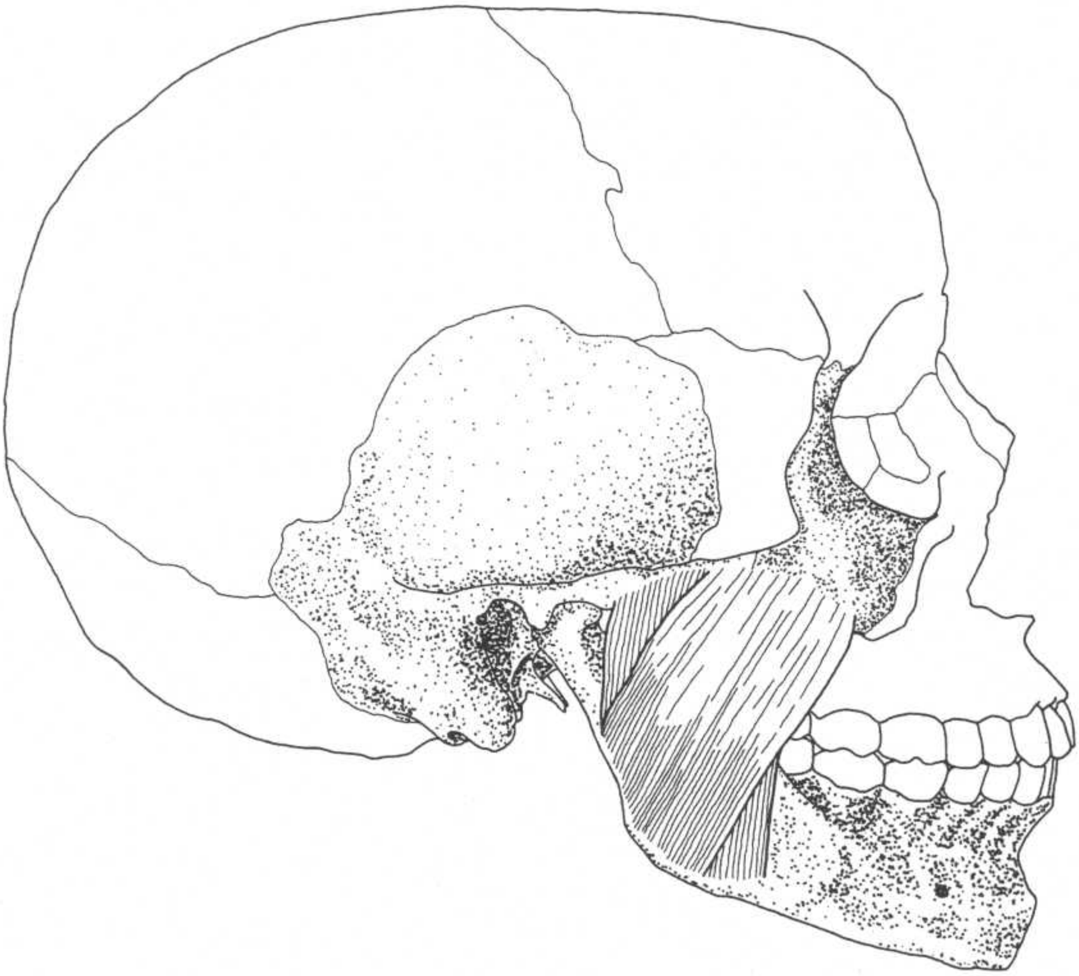
# TEMPORALIS



Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Temporal fossa including frontal, parietal, and temporal bones | **Action** | Closes lower jaw, clenches teeth |
| **Insertion** | Coronoid process and anterior border of ramus of mandible | **Nerve** | Mandibular division of trigeminal nerve |

# MASSETER



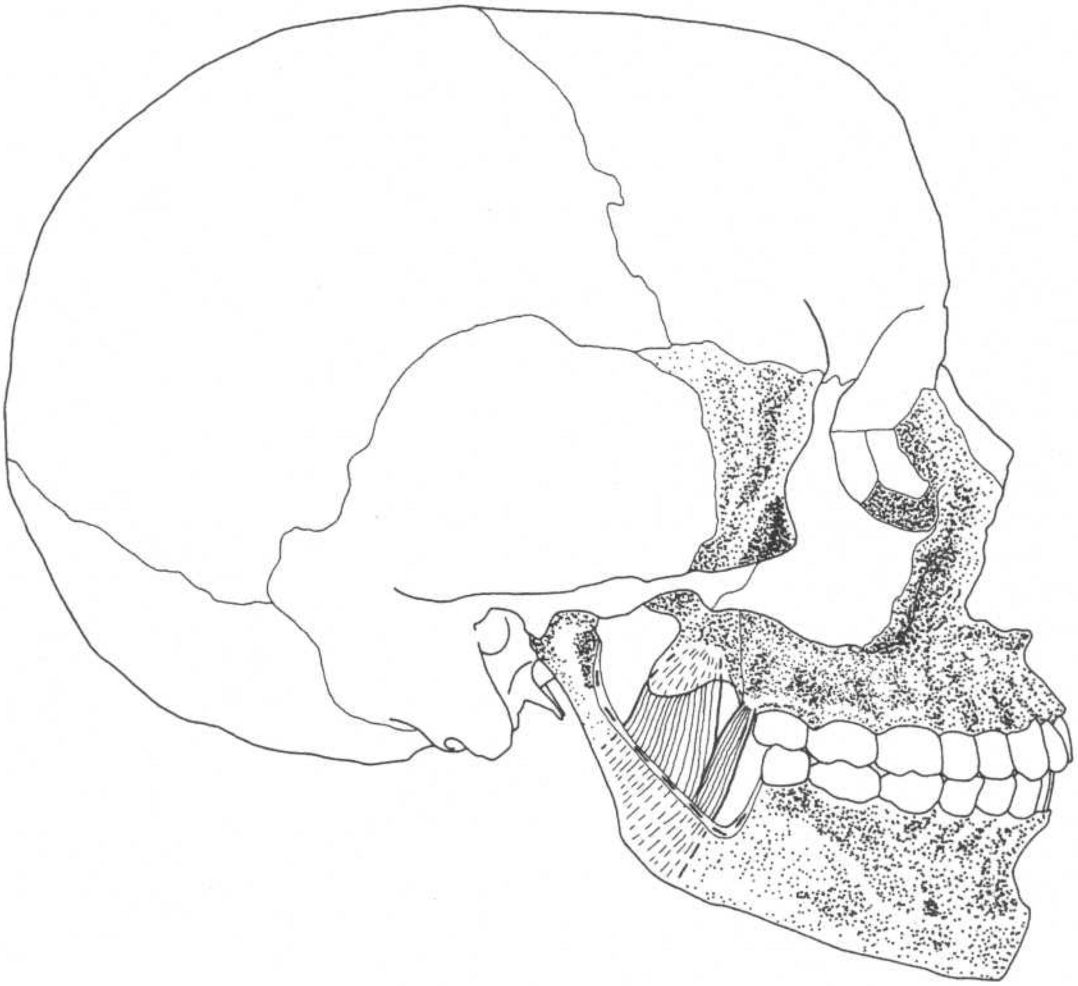
## Skull—lateral view

| | |
|---|---|
| **Origin** | Zygomatic process of maxilla, medial and inferior surfaces of zygomatic arch |
| **Insertion** | Angle and ramus of mandible, lateral surface of coronoid process of mandible |
| **Action** | Closes lower jaw, clenches teeth |
| **Nerve** | Mandibular division of trigeminal nerve |

Note: Superficial fibers slightly protract jaw (see lateral pterygoid).

# PTERYGOIDEUS MEDIALIS

*(Medial Pterygoid)*



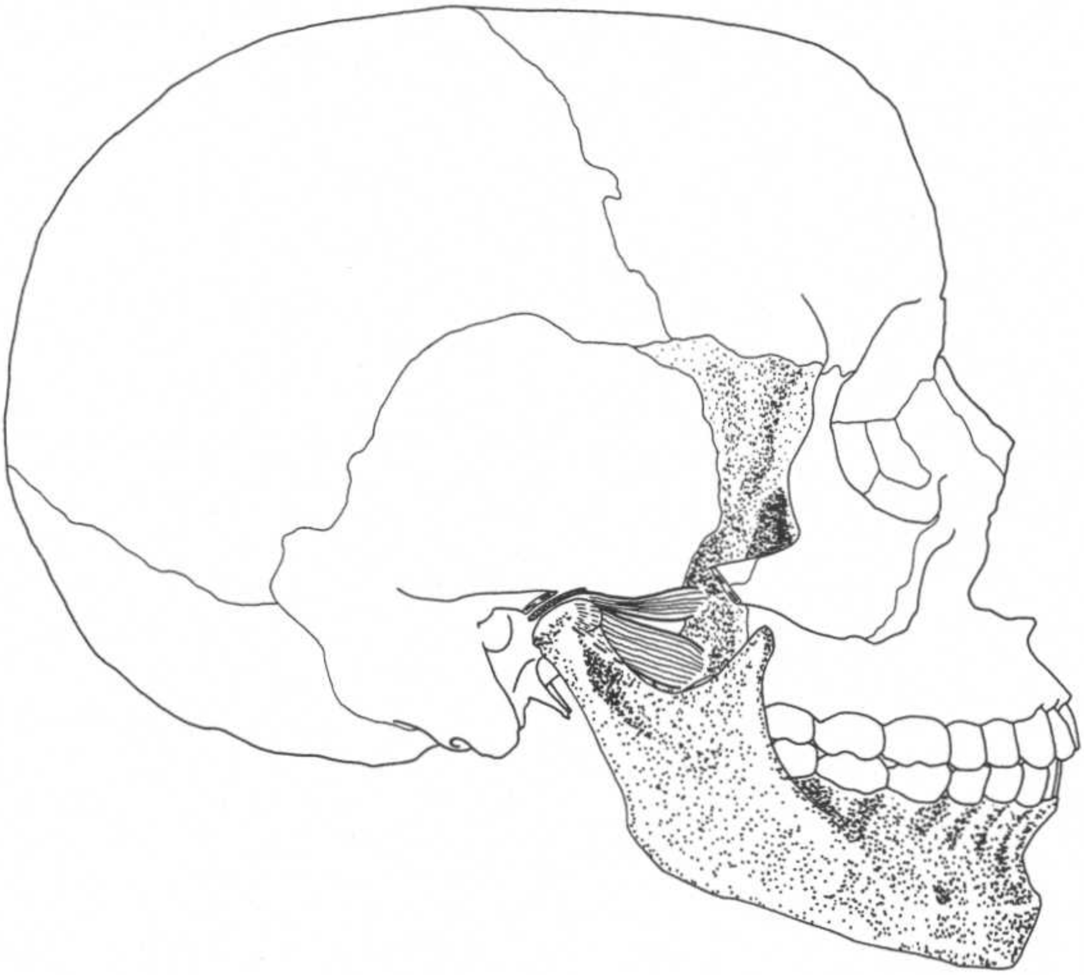
## Skull—lateral view

*(Part of mandible cut away)*

| | |
|---|---|
| **Origin** | Medial surface of lateral pterygoid plate of sphenoid bone, palatine bone, and tuberosity of maxilla |
| **Insertion** | Medial surface of ramus and angle of mandible |
| **Action** | Closes lower jaw, clenches teeth |
| **Nerve** | Mandibular division of trigeminal nerve |

# PTERYGOIDEUS LATERALIS*

(*Lateral Pterygoid*)



## Skull—lateral view

| | | | |
|---|---|---|---|
| **Origin** | Superior head*—lateral surface of greater wing of sphenoid<br>Inferior head—lateral surface of lateral pterygoid plate | **Action** | Opens jaws, protrudes mandible, moves mandible sidewards |
| **Insertion** | Condyle of mandible, temporomandibular joint | **Nerve** | Mandibular division of trigeminal nerve |

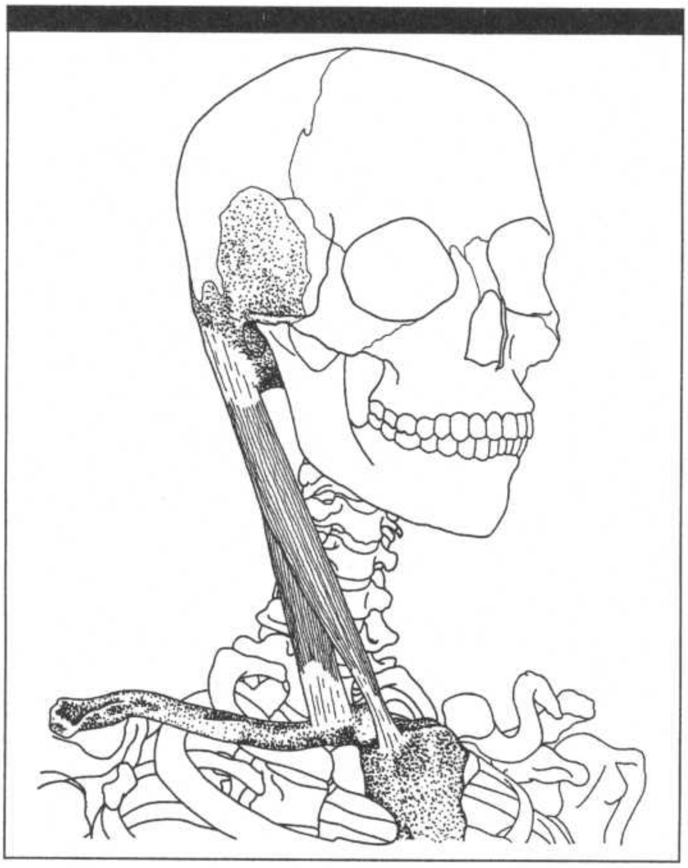
Note: This sideward movement, aided by superficial fibers of masseter, causes chewing movements.

*Stern calls this a separate muscle: superior pterygoid.

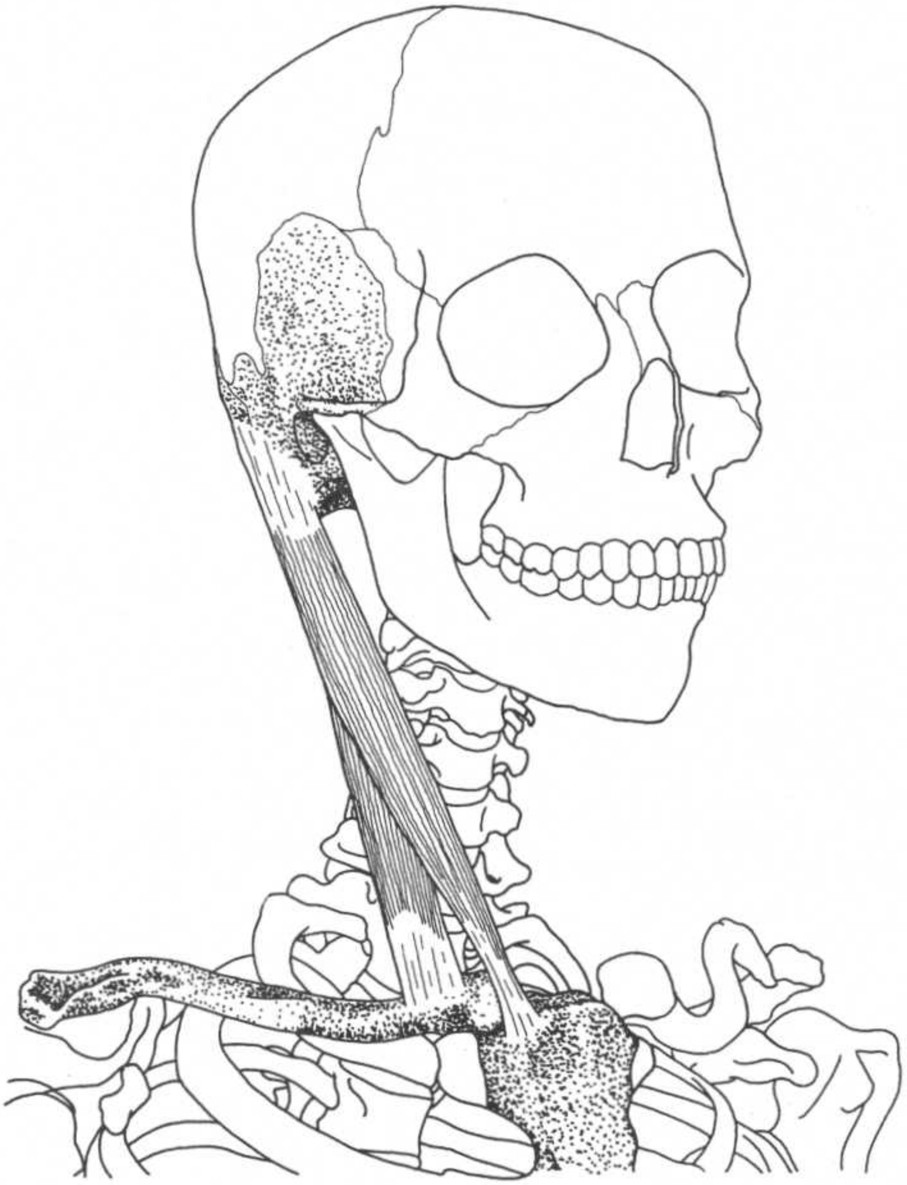
Reference: Stern, JT: *Essentials of Gross Anatomy,* F. A. Davis Company, Philadelphia, 1988.

## CHAPTER FOUR

# MUSCLES OF THE NECK



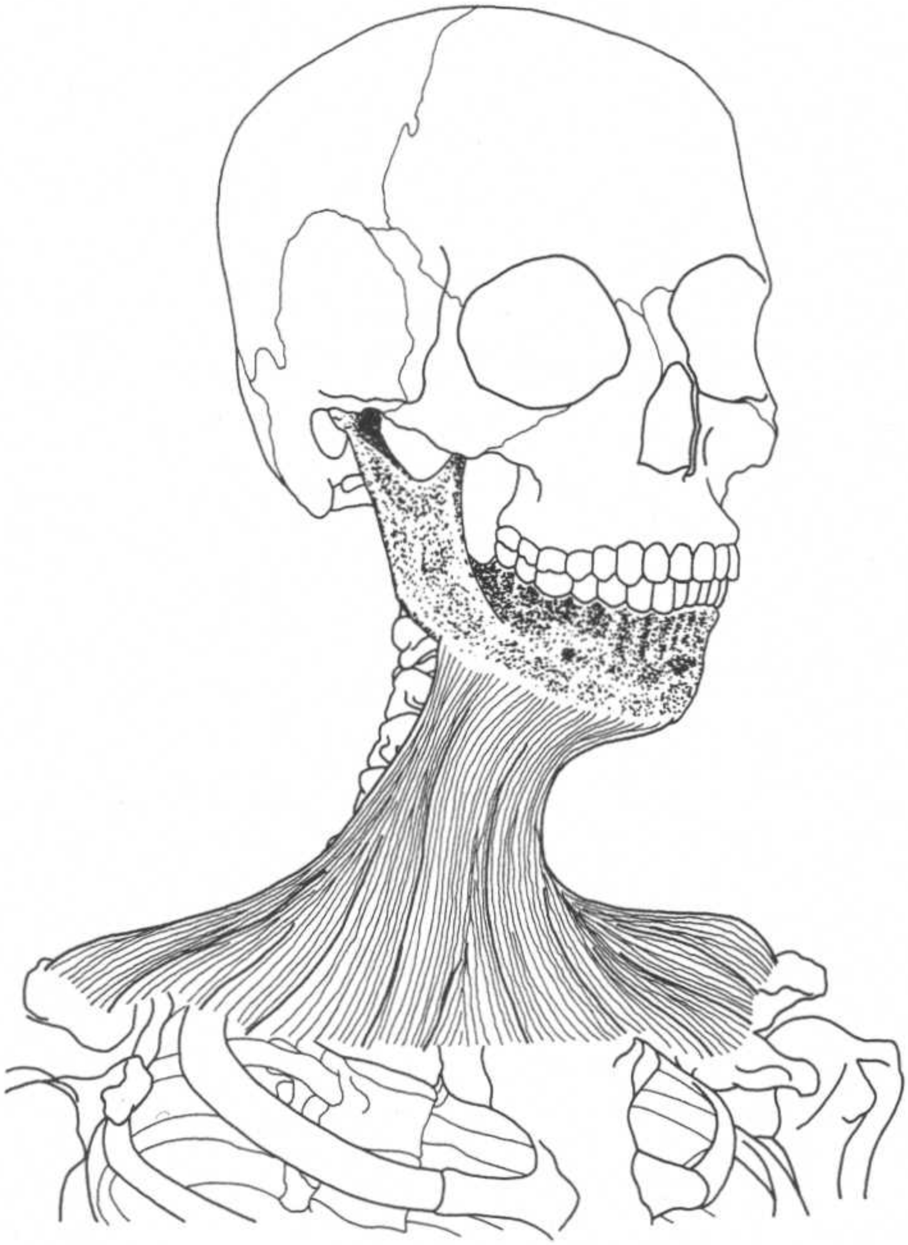
# STERNOCLEIDOMASTOIDEUS



**Three-quarter frontal view**

| | |
|---|---|
| **Origin** | Sternal head—manubrium of sternum<br>Clavicular head—medial part of clavicle |
| **Insertion** | Mastoid process of temporal bone, lateral half of superior nuchal line of occipital bone |
| **Action** | One side—bends neck laterally, rotates head to opposite side<br>Both sides together—flexes neck, draws head ventrally and elevates chin, draws sternum superiorly in deep inspiration |
| **Nerve** | Spinal part of accessory nerve (C2, C3) |

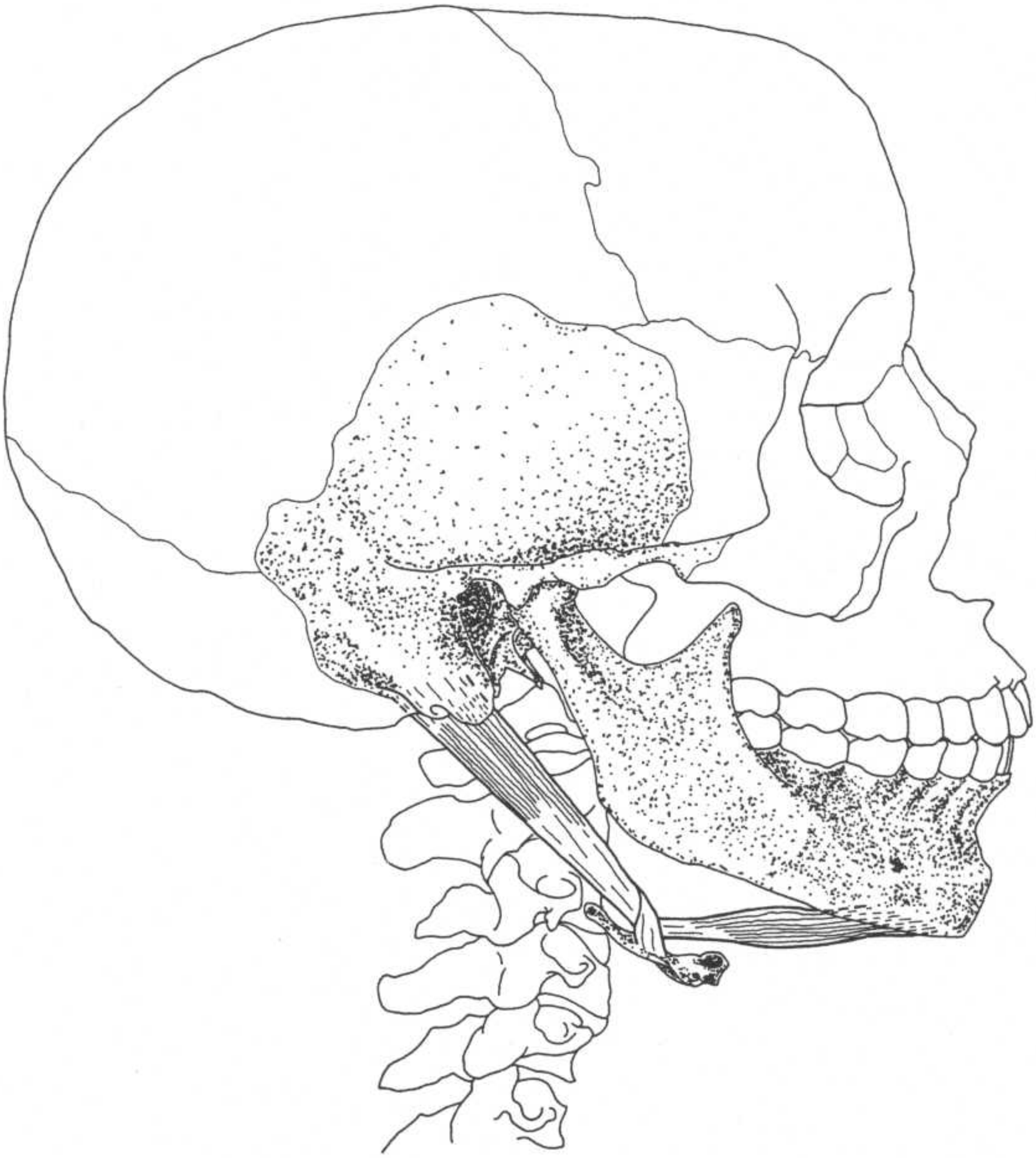
# PLATYSMA



**Three-quarter frontal view**

| | | | |
|---|---|---|---|
| **Origin** | Subcutaneous fascia of upper one-fourth of chest | **Action** | Depresses and draws lower lip laterally, draws up skin of chest |
| **Insertion** | Subcutaneous fascia and muscles of chin and jaw, mandible | **Nerve** | Cervical branch of facial nerve |

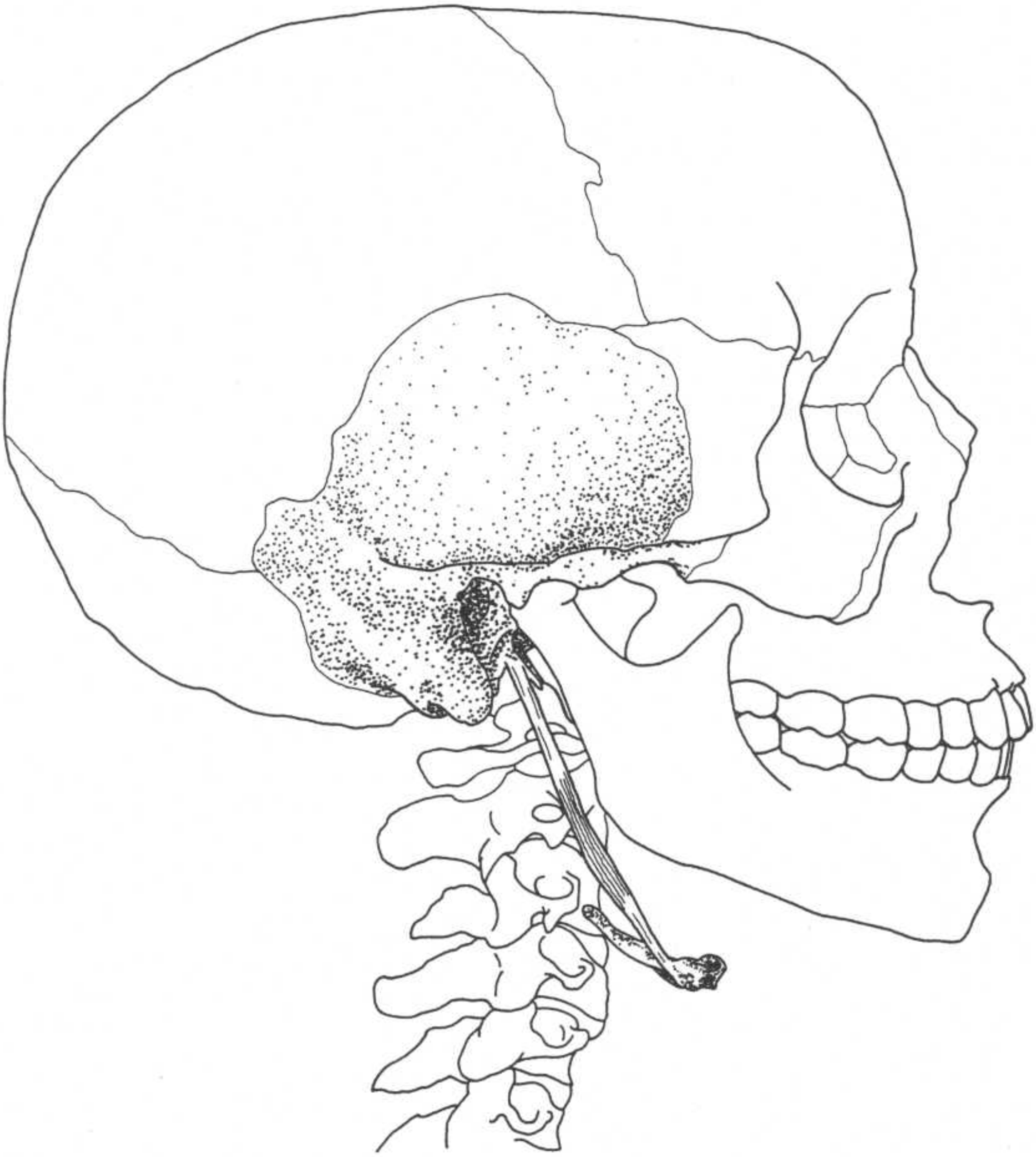
# DIGASTRICUS



**Lateral view**

| | |
|---|---|
| **Origin** | Posterior belly—mastoid notch of temporal bone<br>Anterior belly—inner side of inferior border of mandible near symphysis |
| **Insertion** | Intermediate tendon attached to hyoid bone |
| **Action** | Raises hyoid bone, assists in opening jaws, moves hyoid forward or backward |
| **Nerve** | Anterior belly—mandibular division of trigeminal<br>Posterior belly—facial nerve |

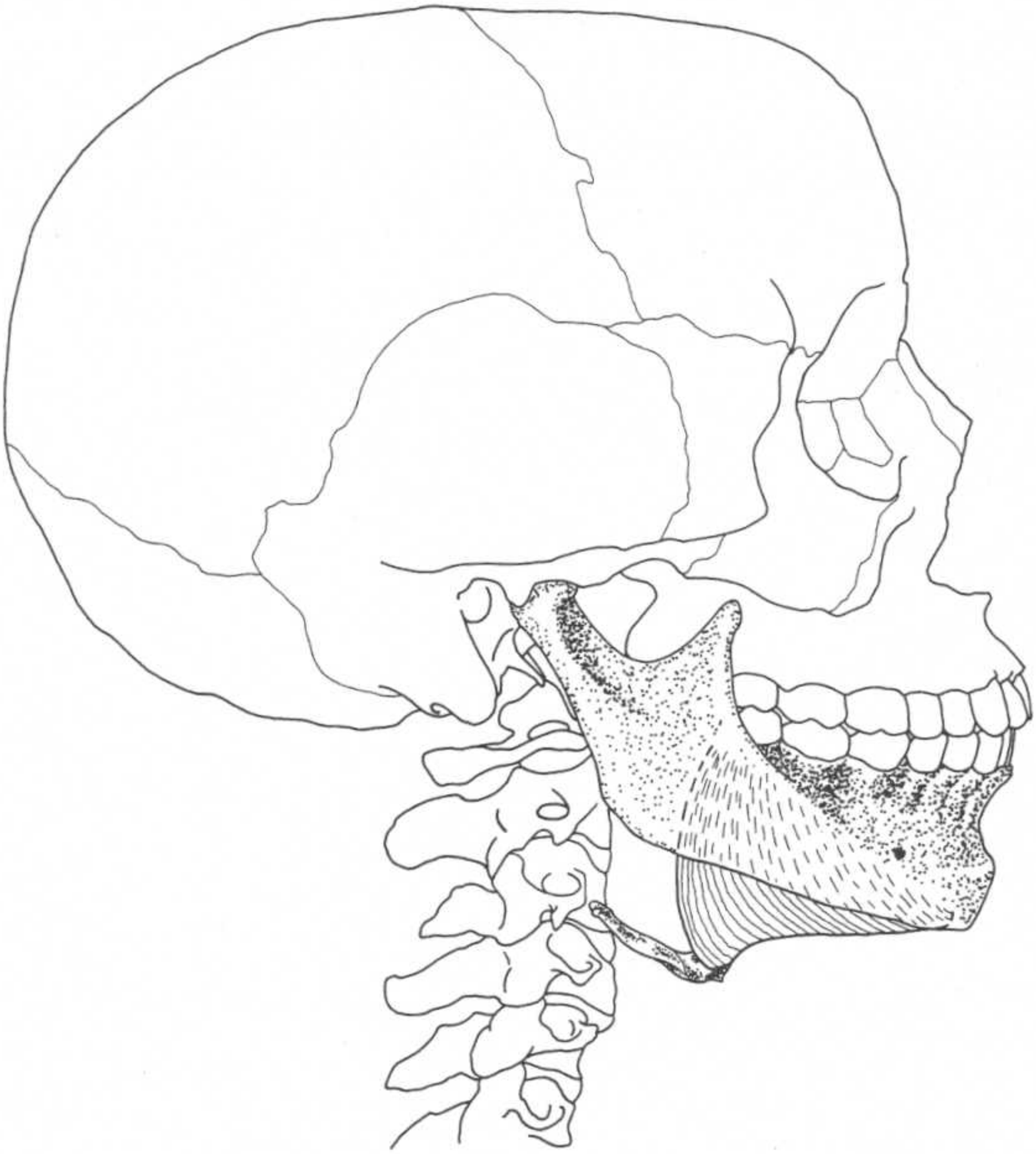
# STYLOHYOIDEUS



Lateral view

| | | | |
|---|---|---|---|
| **Origin** | Styloid process of temporal bone | **Action** | Draws hyoid bone backward, elevates tongue |
| **Insertion** | Hyoid bone | **Nerve** | Facial nerve |

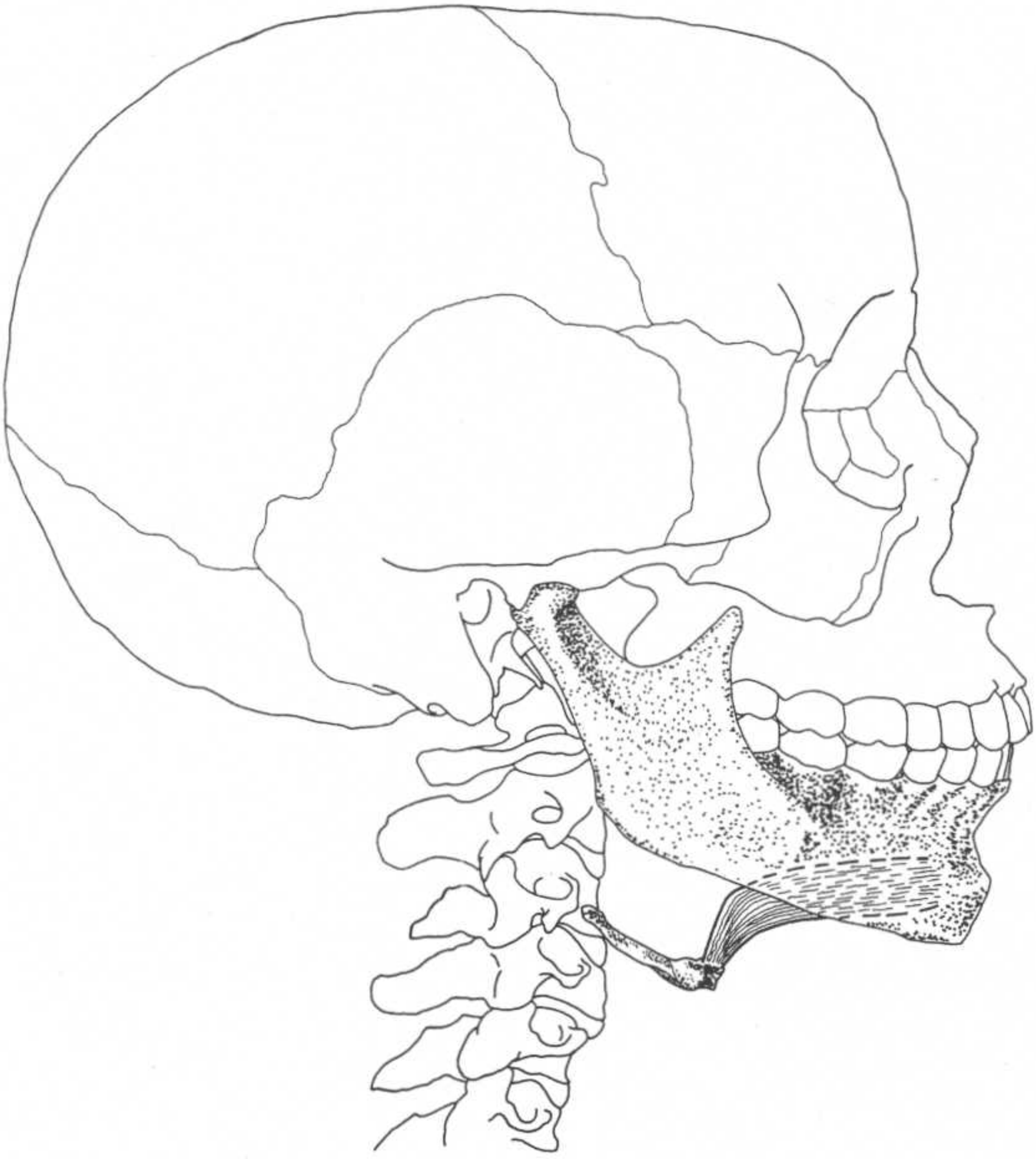
## MYLOHYOIDEUS



**Lateral view**

| | | | |
|---|---|---|---|
| **Origin** | Inside surface of mandible from symphysis to molars (mylohyoid line) | **Action** | Elevates hyoid bone, raises floor of mouth and tongue |
| **Insertion** | Hyoid bone | **Nerve** | Mandibular division of trigeminal nerve |

# GENIOHYOIDEUS



Lateral view

| | | | |
|---|---|---|---|
| **Origin** | Inferior mental spine on interior medial surface of mandible | **Action** | Protrudes hyoid bone and tongue |
| **Insertion** | Body of hyoid bone | **Nerve** | Branch of C1 through hypoglossal nerve |

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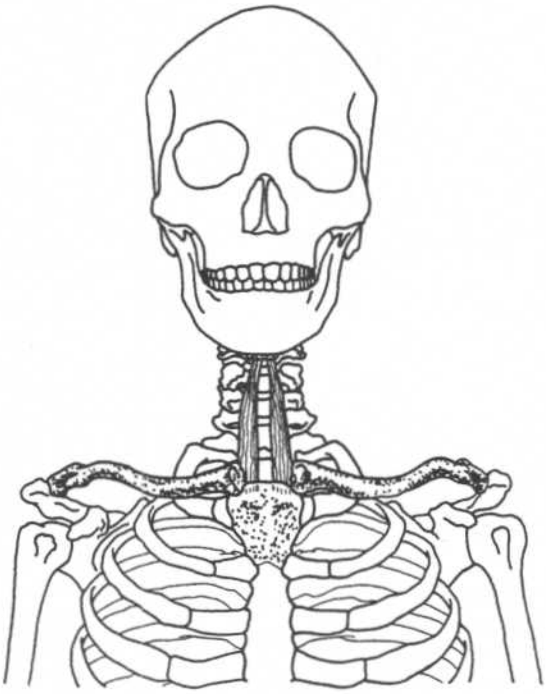
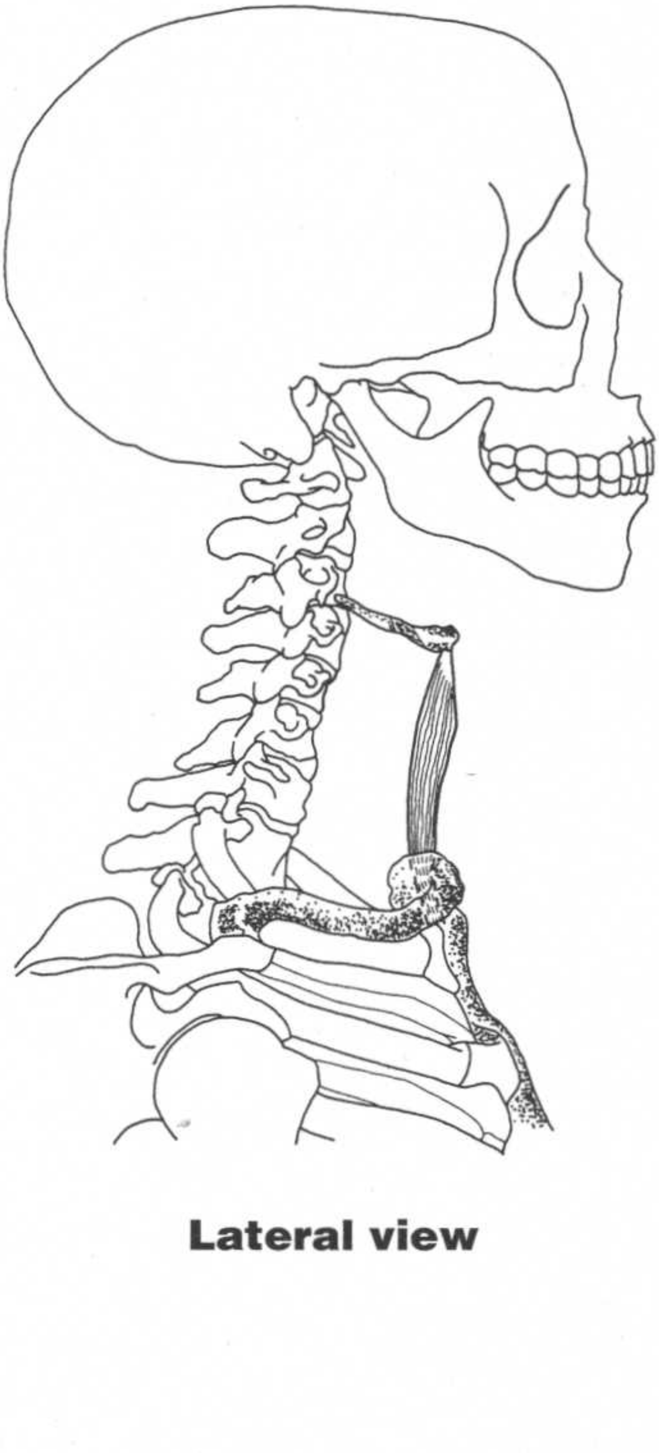
# STERNOHYOIDEUS



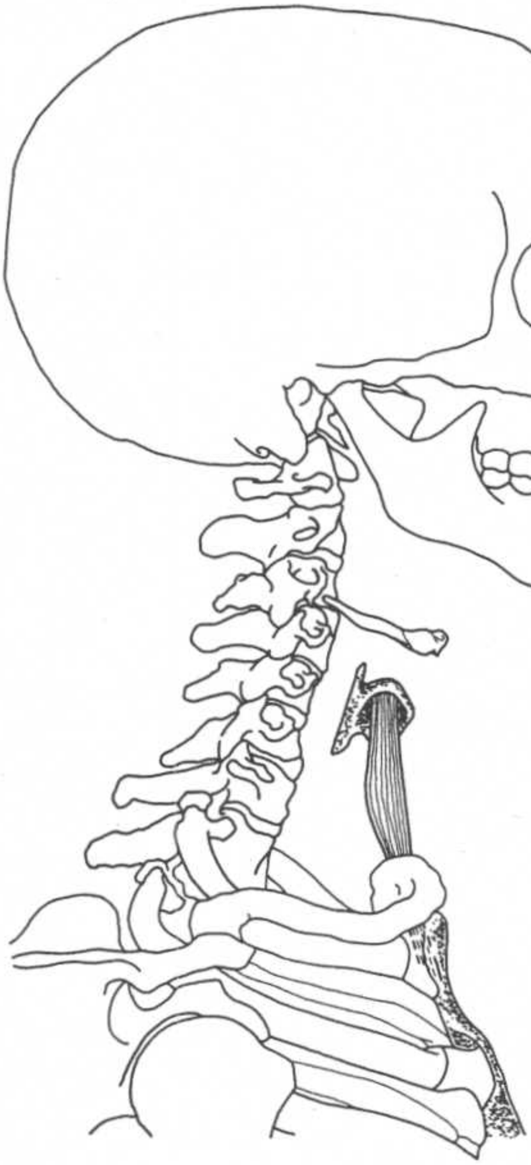
## Frontal view

| | |
|---|---|
| **Origin** | Medial end of clavicle, manubrium of sternum |
| **Insertion** | Body of hyoid bone |
| **Action** | Depresses hyoid bone |
| **Nerve** | Ansa cervicalis (C1–C3) |

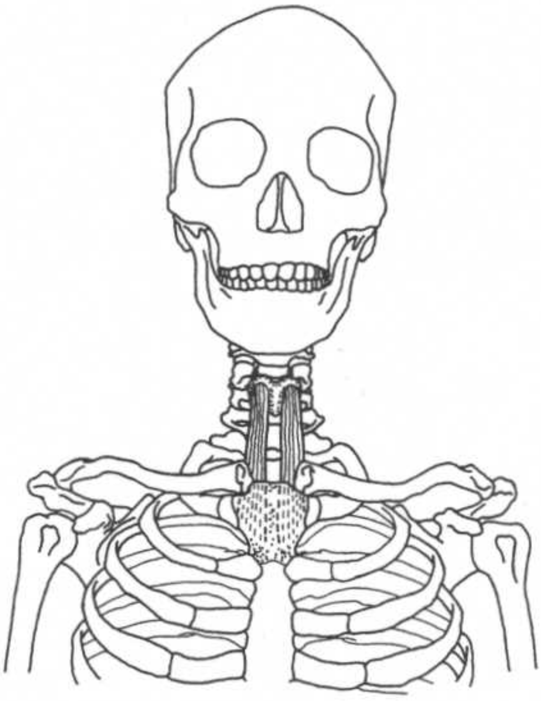


## Lateral view

# STERNOTHYROIDEUS



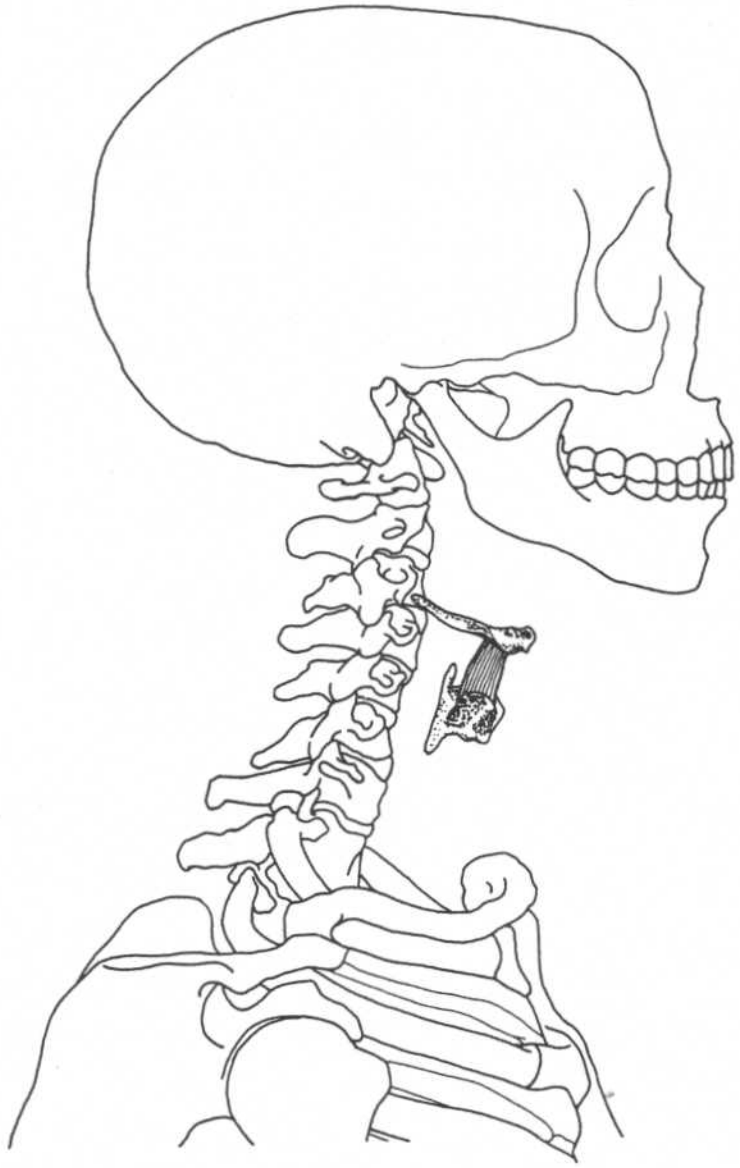
**Lateral view**



**Frontal view**

| | |
|---|---|
| **Origin** | Dorsal surface of manubrium of sternum |
| **Insertion** | Lamina of thyroid cartilage |
| **Action** | Depresses thyroid cartilage |
| **Nerve** | Ansa cervicalis (C1–C3) |

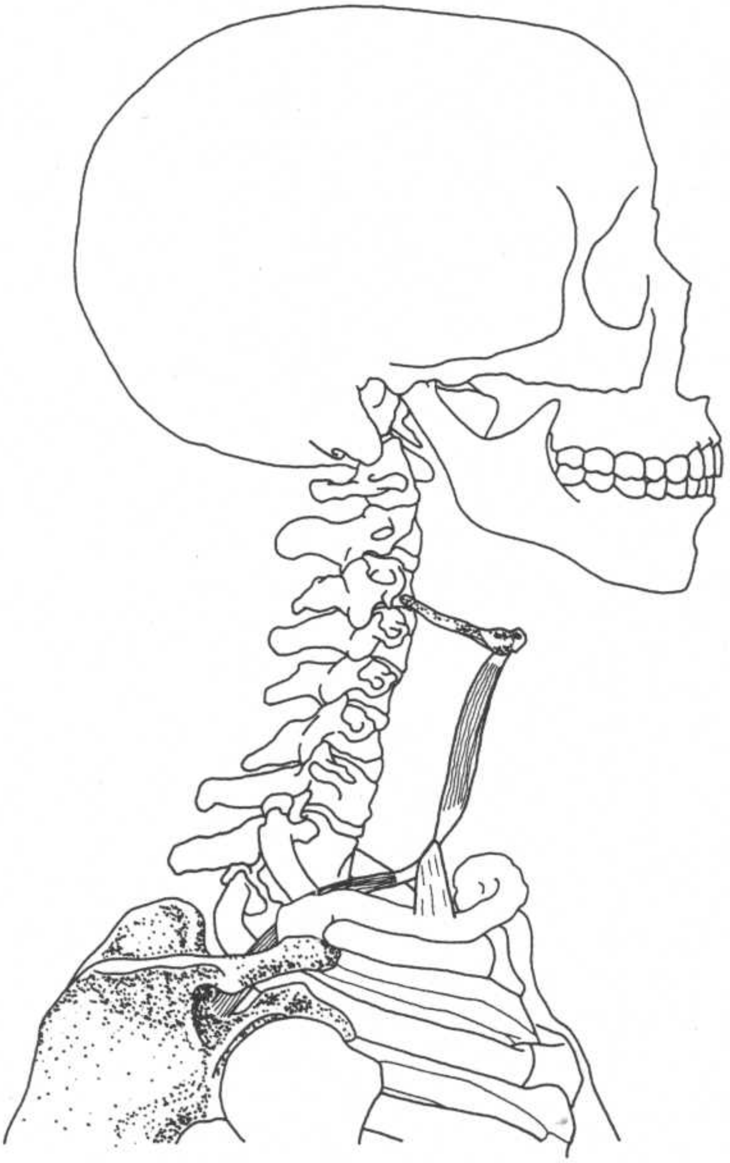
# THYROHYOIDEUS



## Lateral view

| | | | |
|---|---|---|---|
| **Origin** | Lamina of thyroid cartilage | **Action** | Depresses hyoid or raises thyroid |
| **Insertion** | Greater cornu of hyoid bone | **Nerve** | C1 through hypoglossal nerve |

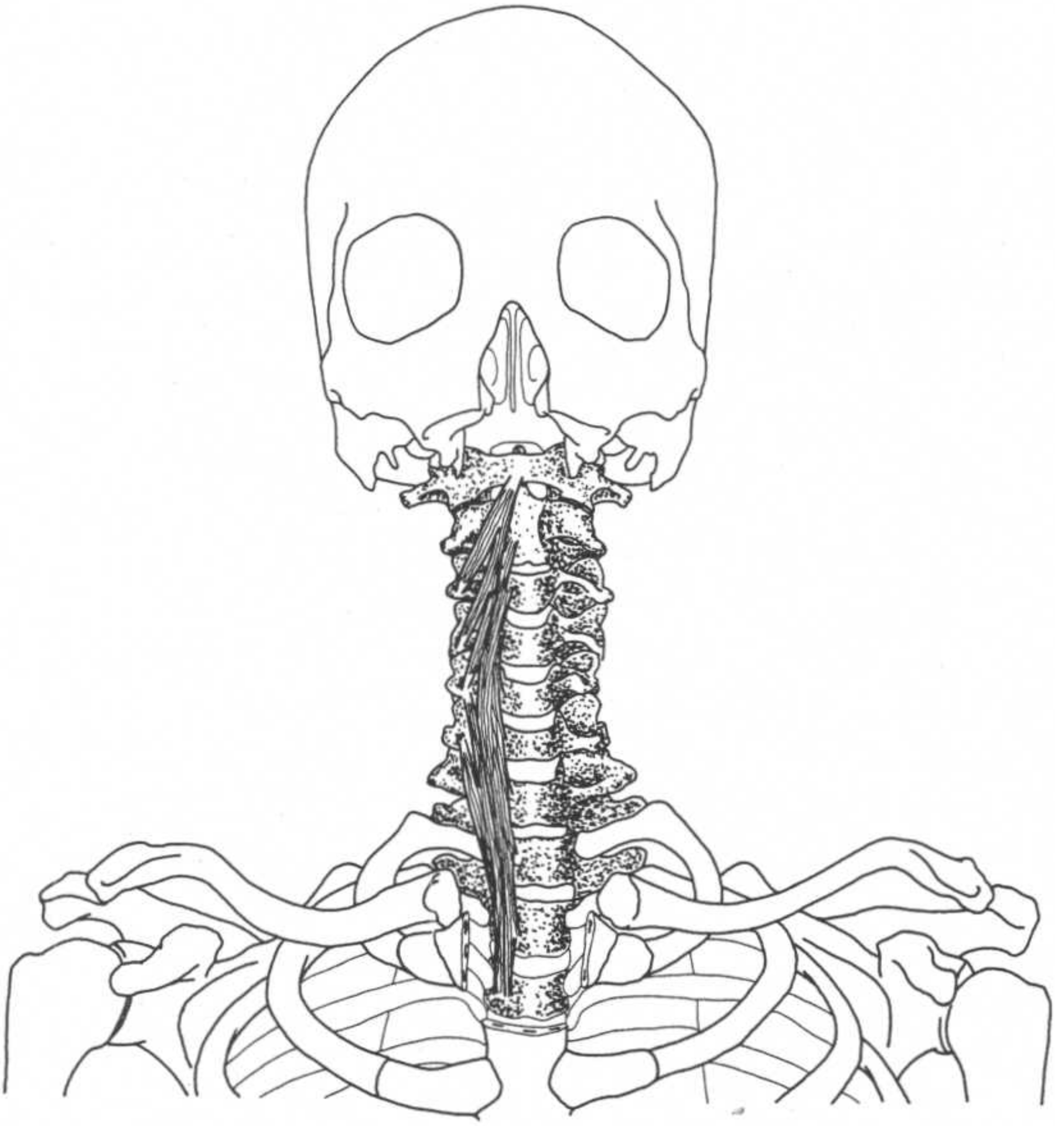
# OMOHYOIDEUS



**Lateral view**

| | | | |
|---|---|---|---|
| **Origin** | Superior border of scapula | **Action** | Depresses hyoid bone |
| **Insertion** | Inferior belly—bound to clavicle by central tendon<br>Superior belly—continues to body of hyoid bone | **Nerve** | Ansa cervicalis (C2, C3) |

# LONGUS COLLI



**Frontal view**

*(Mandible and part of maxilla removed)*

### Superior oblique part

| | |
|---|---|
| **Origin** | Transverse processes of third, fourth, and fifth cervical vertebrae |
| **Insertion** | Anterior arch of atlas |

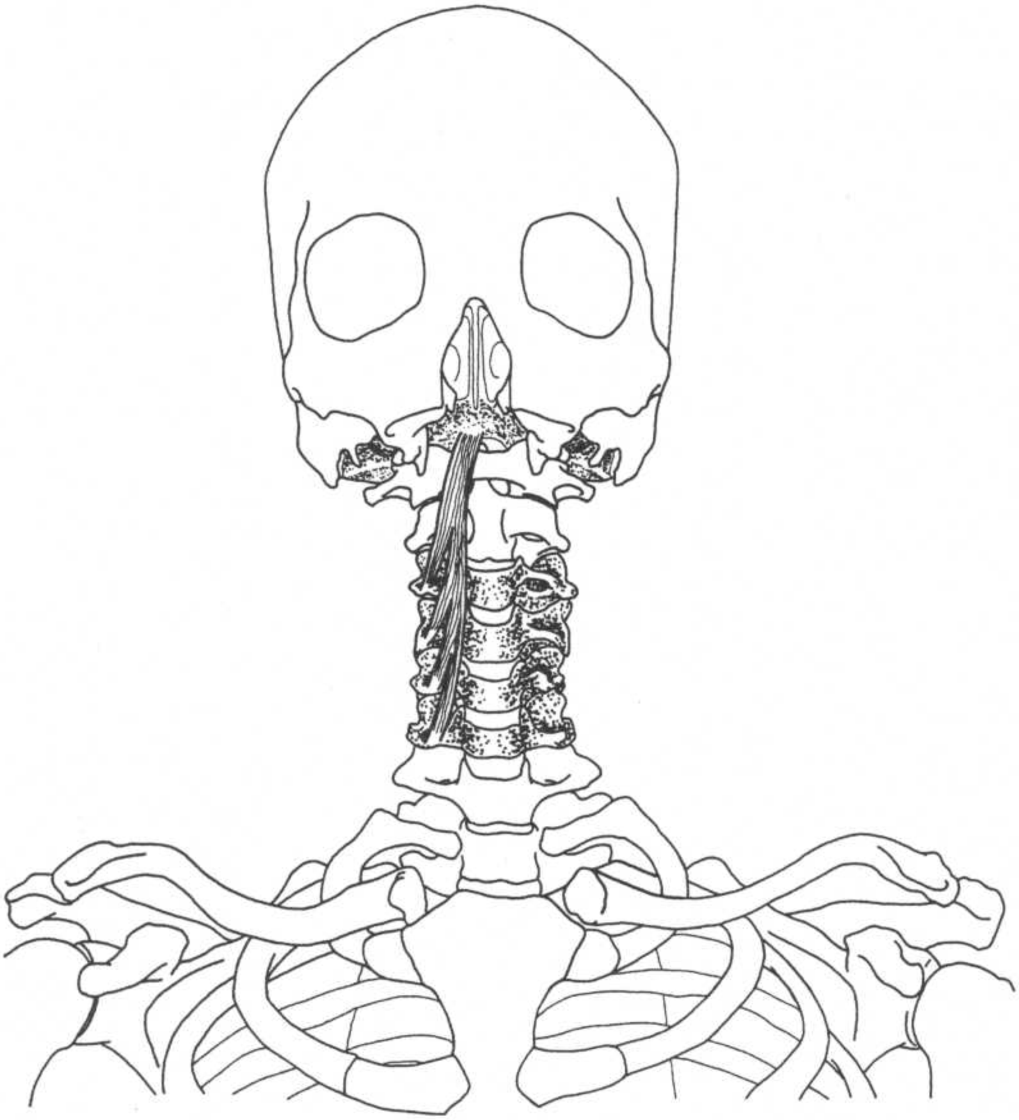
### Inferior oblique part

| | |
|---|---|
| **Origin** | Anterior surface of bodies of first two or three thoracic vertebrae |
| **Insertion** | Transverse processes of fifth and sixth cervical vertebrae |

### Vertical part

| | |
|---|---|
| **Origin** | Anterior surfaces of bodies of upper three thoracic and lower three cervical vertebrae |
| **Insertion** | Anterior surfaces of the second, third, and fourth cervical vertebrae |
| **Action** | All three parts flex cervical vertebrae |
| **Nerve** | C2–C7 |

# LONGUS CAPITIS

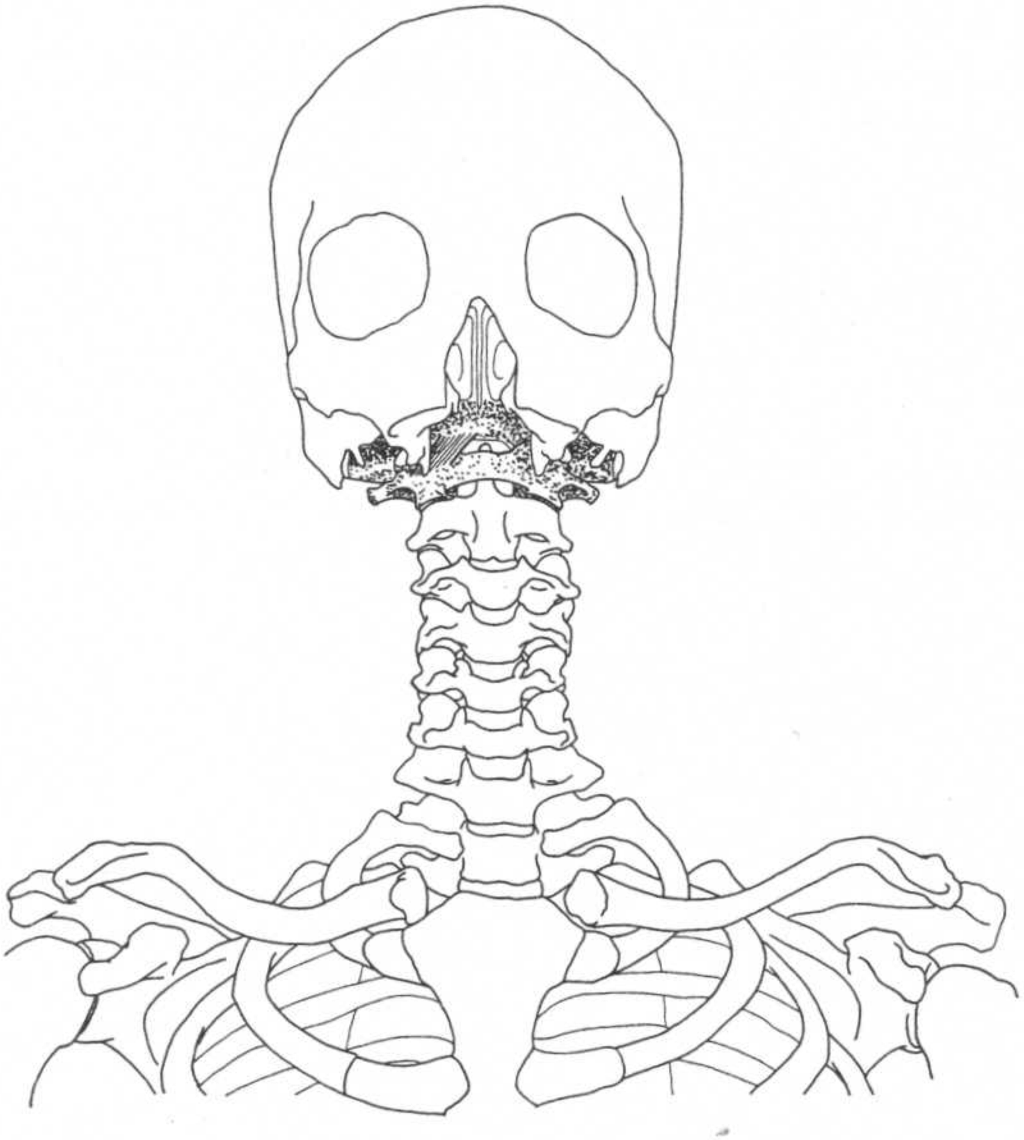


**Frontal view**

*(Mandible and part of maxilla removed)*

| | | | |
|---|---|---|---|
| **Origin** | Transverse processes of third through sixth cervical vertebrae | **Action** | Flexes head |
| **Insertion** | Occipital bone anterior to foramen magnum | **Nerve** | C1–C3 |

# RECTUS CAPITIS ANTERIOR

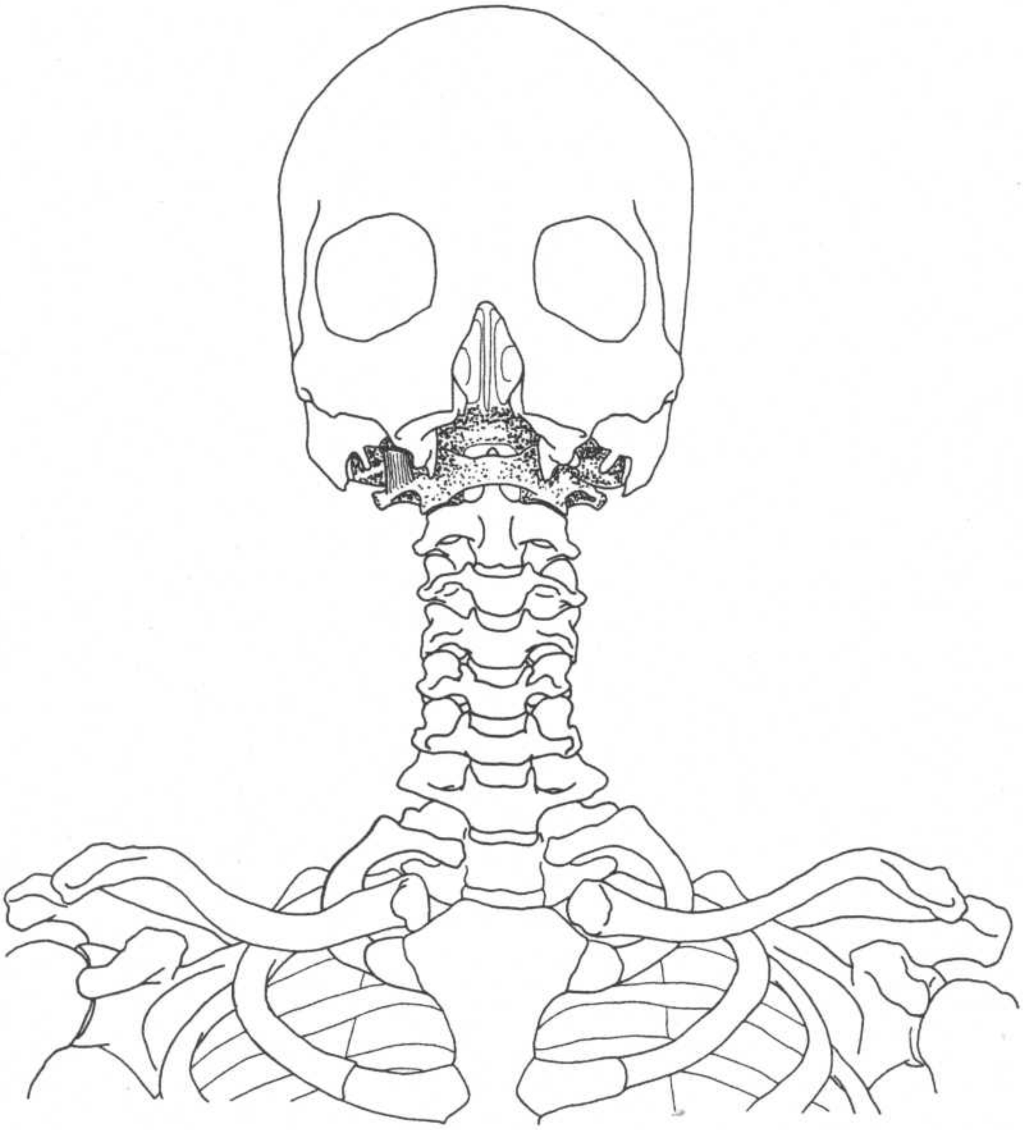


## Frontal view

*(Mandible and part of maxilla removed)*

| | | | |
|---|---|---|---|
| **Origin** | Anterior base of transverse process of atlas | **Action** | Flexes head |
| **Insertion** | Occipital bone anterior to foramen magnum | **Nerve** | C2, C3 |

# RECTUS CAPITIS LATERALIS

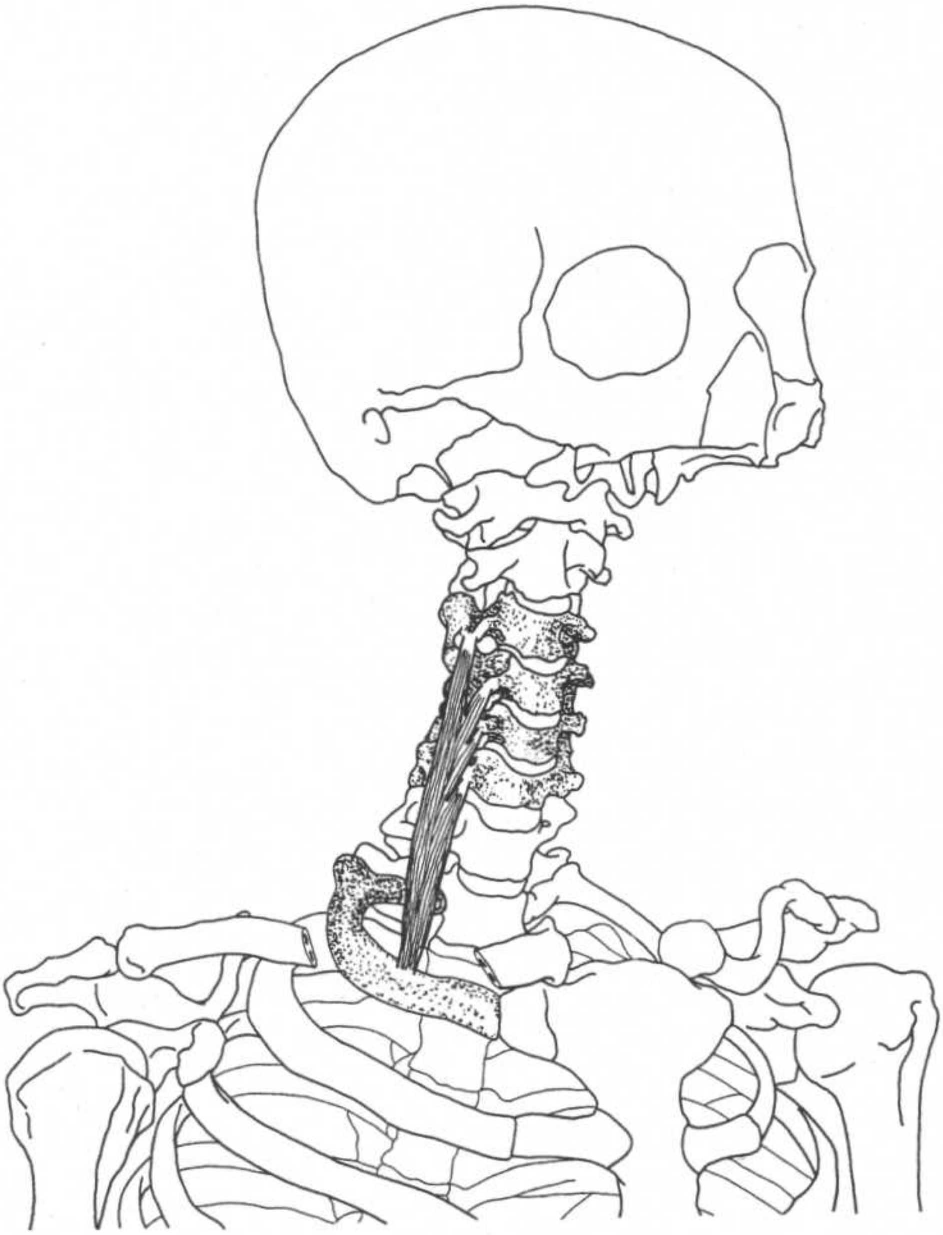


**Frontal view**

*(Mandible and part of maxilla removed)*

| | | | |
|---|---|---|---|
| **Origin** | Transverse process of atlas | **Action** | Bends head laterally |
| **Insertion** | Jugular process of occipital bone | **Nerve** | C2, C3 |

# SCALENUS ANTERIOR

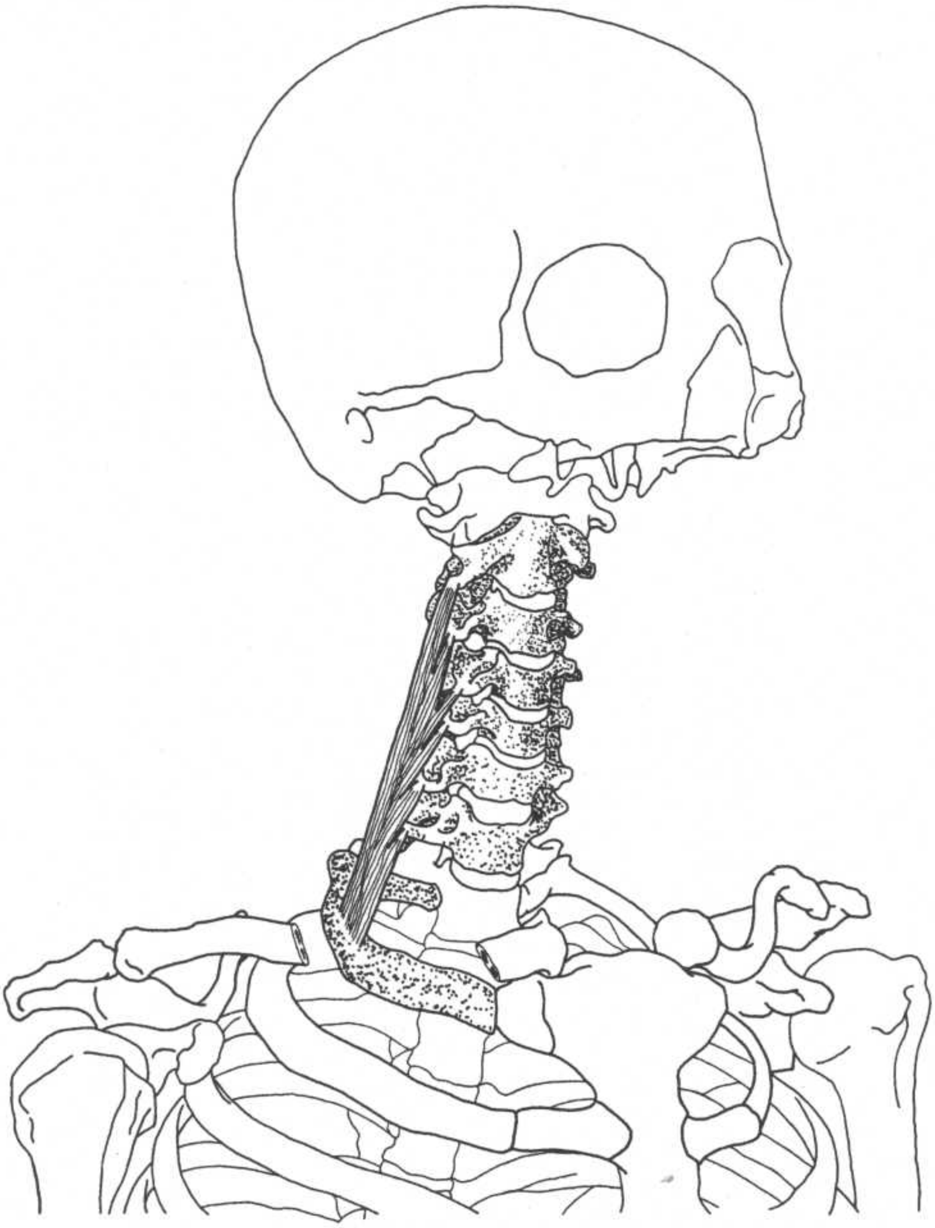


## Three-quarter frontal view

*(Mandible and part of maxilla removed)*

| | | | |
|---|---|---|---|
| **Origin** | Transverse processes of third through sixth cervical vertebrae | **Action** | Raises first rib (respiratory inspiration); acting together, they flex neck; acting on one side, they laterally flex, rotate neck |
| **Insertion** | Inner border of first rib (scalene tubercle) | **Nerve** | Ventral rami of cervical nerves |

# SCALENUS MEDIUS

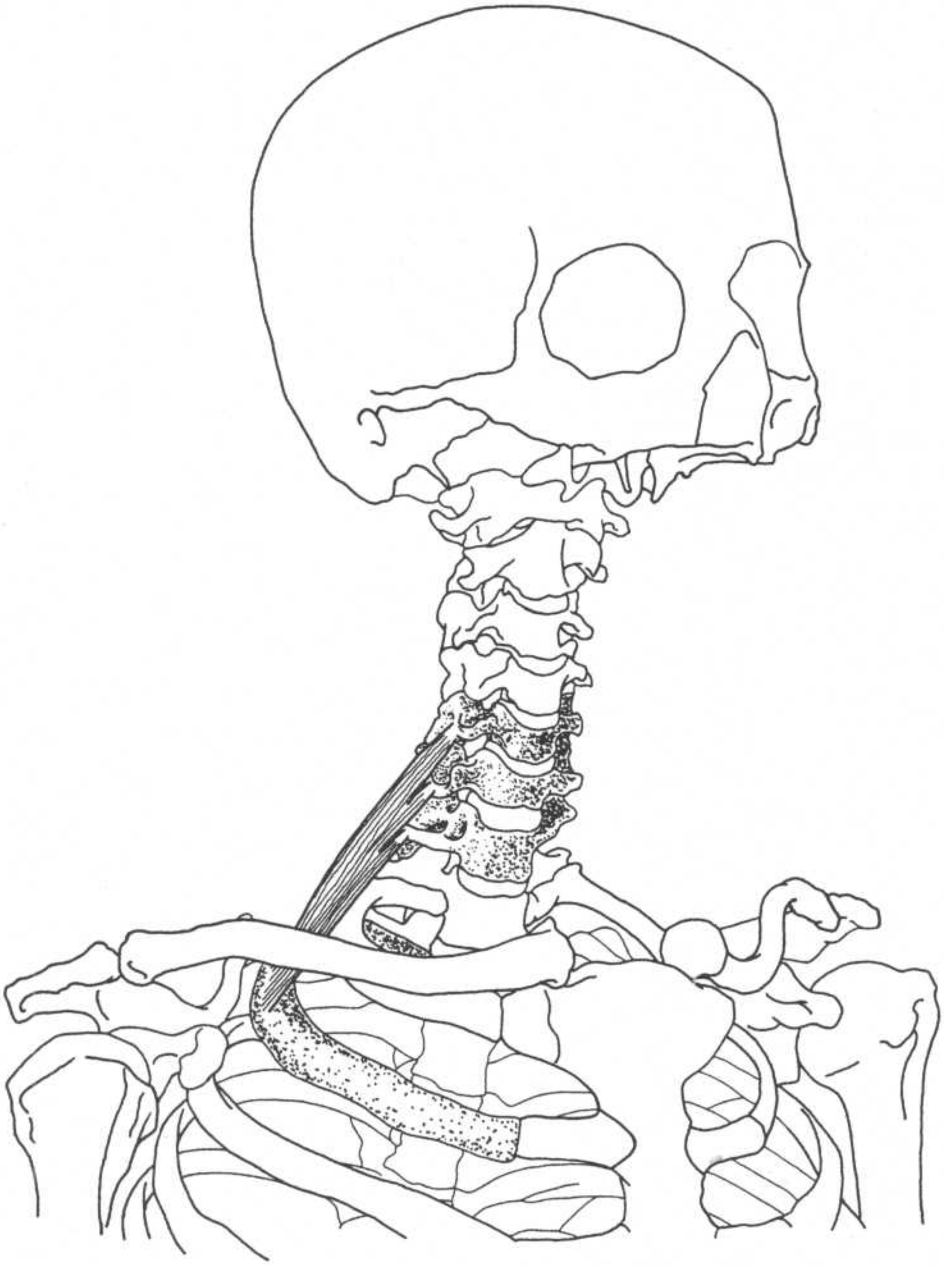


## Three-quarter frontal view

*(Mandible and part of maxilla removed)*

| | |
|---|---|
| **Origin** | Transverse processes of lower six cervical vertebrae (C2–C7) |
| **Insertion** | Upper surface of first rib |
| **Action** | Raises first rib (respiratory inspiration); acting together, they flex neck; acting on one side, they laterally flex, rotate neck |
| **Nerve** | Ventral rami of cervical nerves |

# SCALENUS POSTERIOR

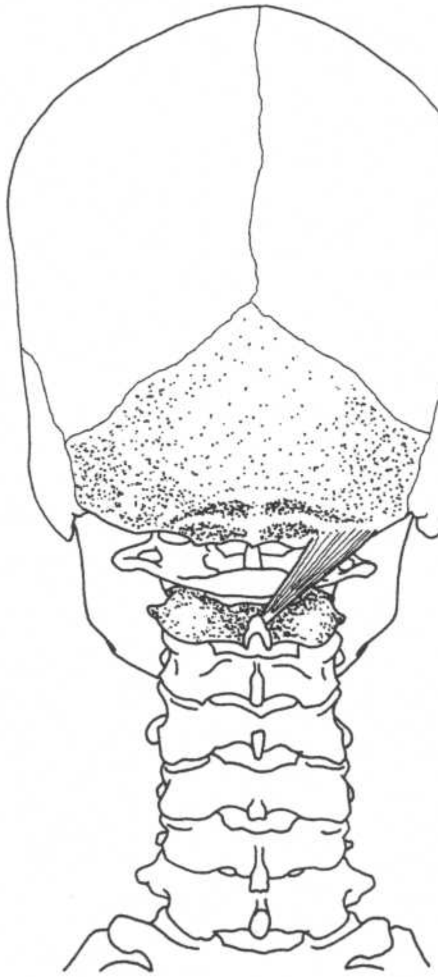


## Three-quarter frontal view

*(Mandible and part of maxilla removed)*

| | | | |
|---|---|---|---|
| **Origin** | Transverse processes of lower two or three cervical vertebrae (C5–C7) | **Action** | Raises second rib (respiratory inspiration); acting together, they flex neck; acting on one side, they laterally flex, rotate neck |
| **Insertion** | Outer surface of second rib | **Nerve** | Ventral rami of lower cervical nerves |

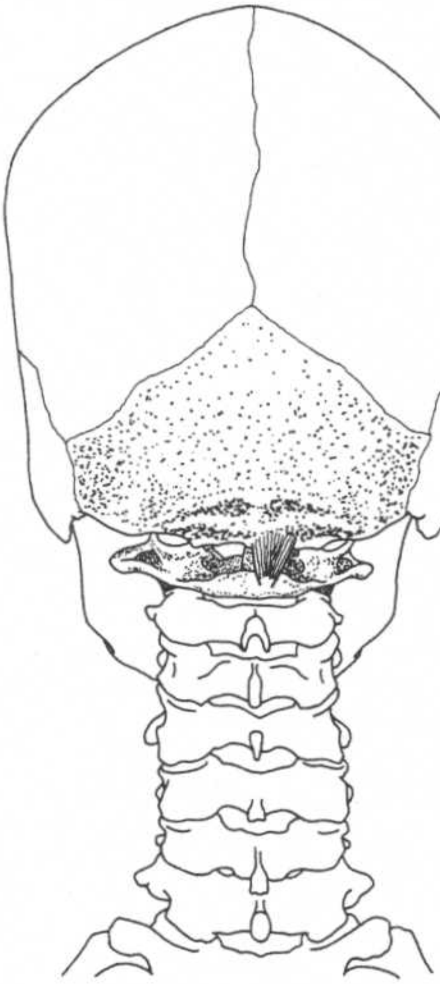
# RECTUS CAPITIS POSTERIOR MAJOR



**Posterior skull and cervical vertebrae**

| | | | |
|---|---|---|---|
| **Origin** | Spinous process of axis | **Action** | Extends and rotates head |
| **Insertion** | Lateral portion of inferior nuchal line of occipital bone | **Nerve** | Suboccipital nerve |

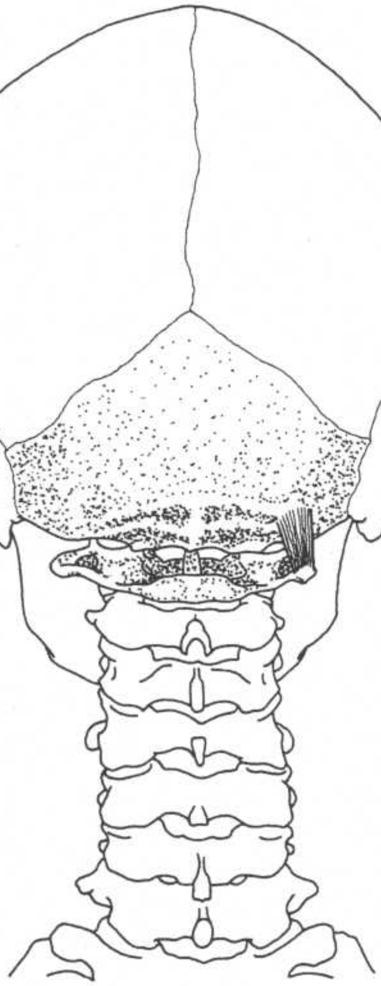
# RECTUS CAPITIS POSTERIOR MINOR



Posterior skull and cervical vertebrae

| | | | |
|---|---|---|---|
| **Origin** | Posterior arch of atlas | **Action** | Extends head |
| **Insertion** | Medial portion of inferior nuchal line of occipital bone | **Nerve** | Suboccipital nerve |

# OBLIQUUS CAPITIS SUPERIOR

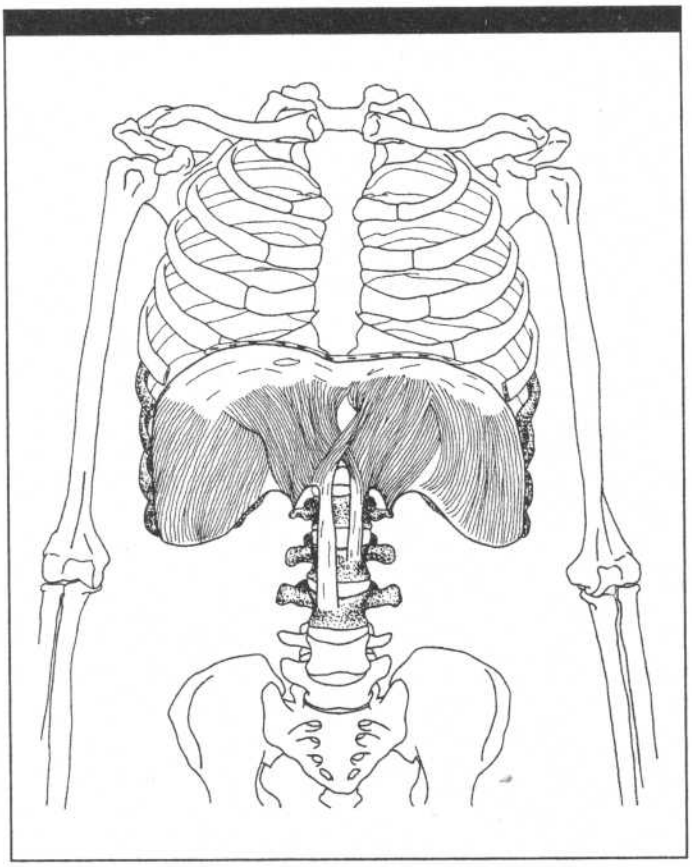


Posterior skull and cervical vertebrae

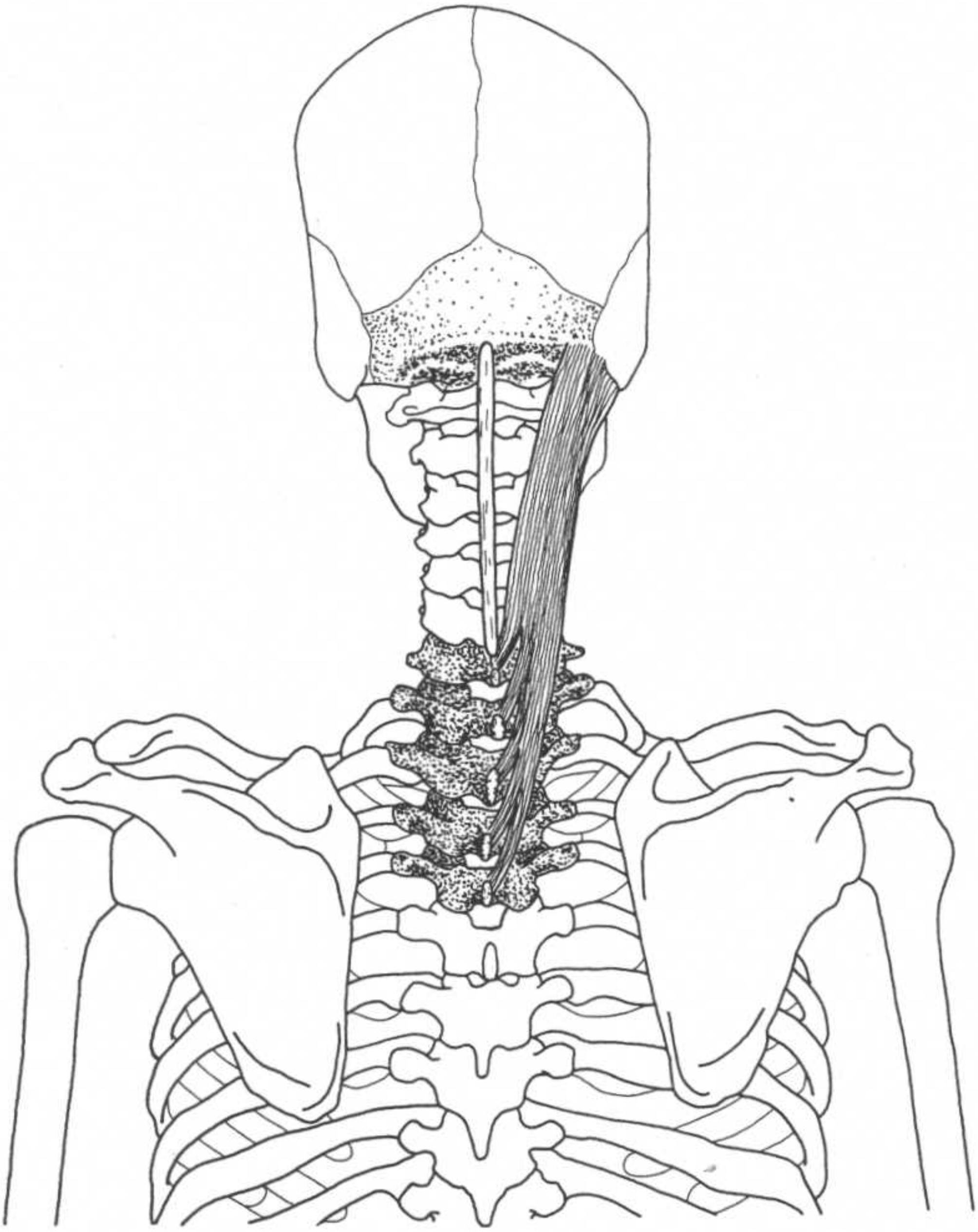
| | | | |
|---|---|---|---|
| **Origin** | Transverse process of atlas | **Action** | Extends and bends head laterally |
| **Insertion** | Occipital bone between inferior and superior nuchal lines | **Nerve** | Suboccipital nerve |

## CHAPTER FIVE

# MUSCLES OF THE TRUNK



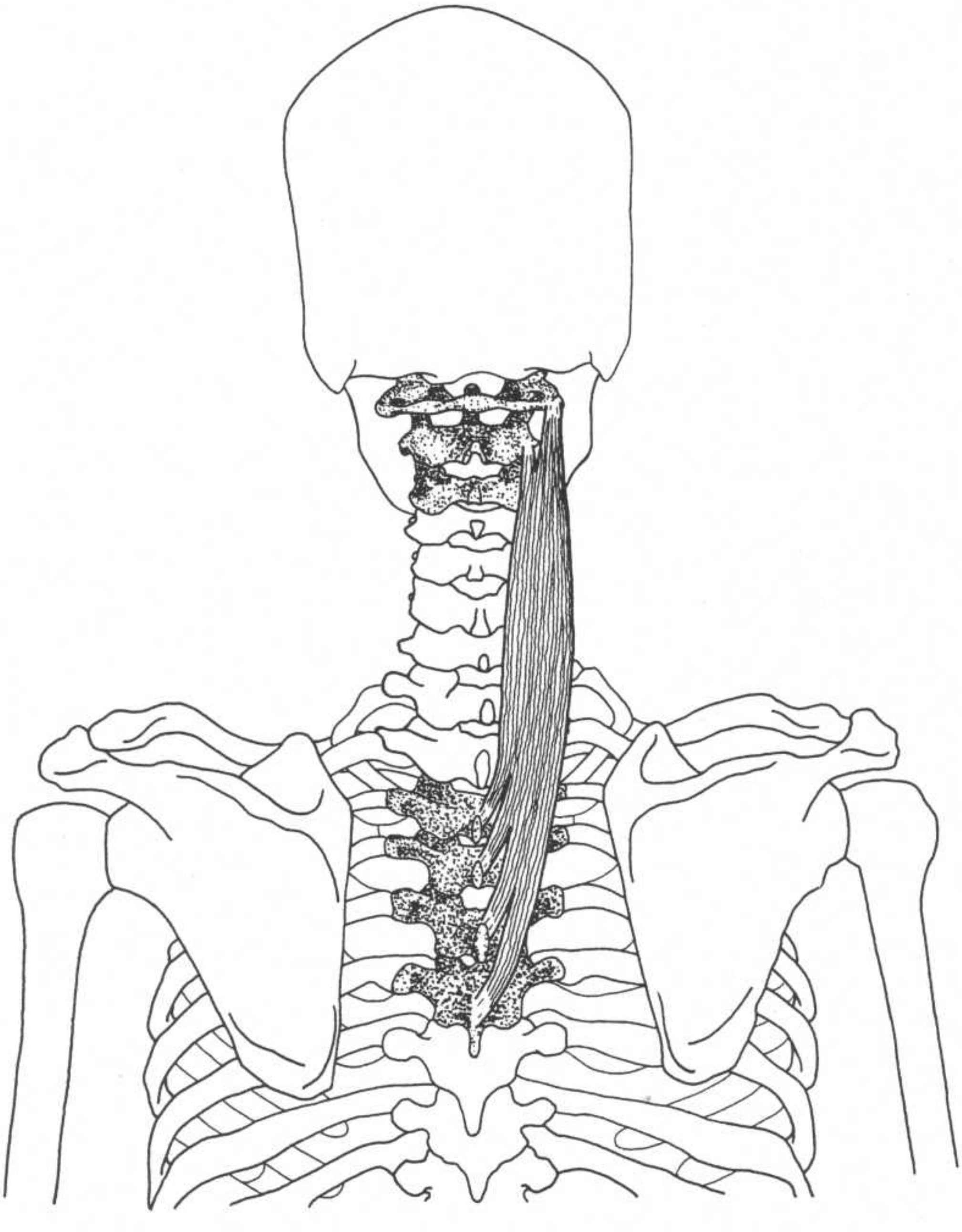
# SPLENIUS CAPITIS



**Posterior skull, neck, and back**

| | |
|---|---|
| **Origin** | Lower part of ligamentum nuchae, spinous processes of seventh cervical vertebra (C7) and upper three or four thoracic vertebrae (T1–T4) |
| **Insertion** | Mastoid process of temporal bone and lateral part of superior nuchal line |
| **Action** | Acting together, they extend, hyperextend head, neck; acting on one side, they laterally flex, rotate head, neck |
| **Nerve** | Lateral branches of dorsal primary divisions of middle and lower cervical nerves |

# SPLENIUS CERVICIS



**Posterior skull, neck, and back**

| | |
|---|---|
| **Origin** | Spinous processes of third through sixth thoracic vertebrae (T3–T6) |
| **Insertion** | Transverse processes of upper two or three cervical vertebrae (C1–C3) |
| **Action** | Acting together, they extend, hyperextend head, neck; acting on one side, they laterally flex, rotate head, neck |
| **Nerve** | Lateral branches of dorsal primary divisions of middle and lower cervical nerves |

# ERECTOR SPINAE*

## ILIOCOSTALIS LUMBORUM

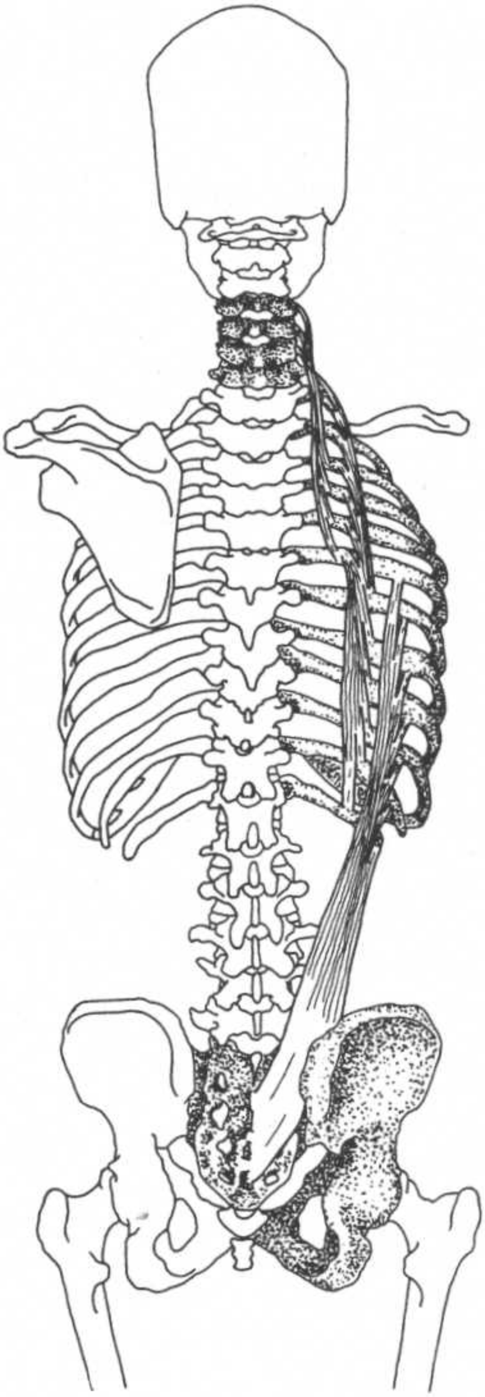
| | |
|---|---|
| **Origin** | Medial and lateral sacral crests and medial part of iliac crests |
| **Insertion** | Angles of lower six ribs |
| **Action** | Extension, lateral flexion of vertebral column, rotates ribs for forceful inspiration |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## ILIOCOSTALIS THORACIS

| | |
|---|---|
| **Origin** | Angles of lower six ribs medial to iliocostalis lumborum |
| **Insertion** | Angles of upper six ribs and transverse process of seventh cervical vertebra |
| **Action** | Extension, lateral flexion of vertebral column, rotates ribs for forceful inspiration |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## ILIOCOSTALIS CERVICIS

| | |
|---|---|
| **Origin** | Angles of third through sixth ribs |
| **Insertion** | Transverse processes of fourth, fifth, and sixth cervical vertebrae |
| **Action** | Extension, lateral flexion of vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |



**Trunk—dorsal view**

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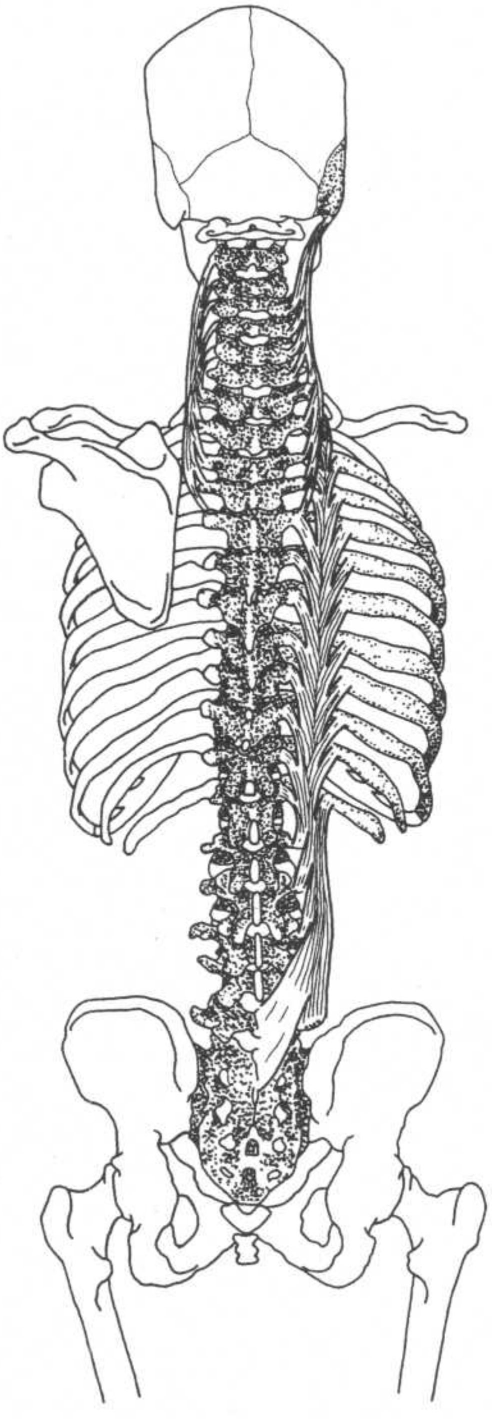
*The erector spinae (sacrospinalis) is a complex of three sets of muscles: iliocostalis, longissimus, and spinalis. The origin of this group is the medial and lateral sacral crests, the medial part of iliac crests, and the spinous processes and supraspinal ligament of lumbar and eleventh and twelfth thoracic vertebrae.

# ERECTOR SPINAE



Trunk—dorsal view

## LONGISSIMUS THORACIS

| | |
|---|---|
| **Origin** | Medial and lateral sacral crests, spinous processes and supraspinal ligament of lumbar and eleventh and twelfth thoracic vertebrae, and medial part of iliac crests |
| **Insertion** | Transverse processes of all thoracic vertebrae, between tubercles and angles of lower nine or ten ribs |
| **Action** | Extension, lateral flexion of vertebral column, rotates ribs for forceful inspiration |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## LONGISSIMUS CERVICIS

| | |
|---|---|
| **Origin** | Transverse processes of upper four or five thoracic vertebrae (T1–T5) |
| **Insertion** | Transverse processes of second through sixth cervical vertebrae |
| **Action** | Extension, lateral flexion of vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## LONGISSIMUS CAPITIS

| | |
|---|---|
| **Origin** | Transverse processes of upper five thoracic vertebrae (T1–T5), articular processes of lower three cervical vertebrae (C5–C7) |
| **Insertion** | Posterior part of mastoid process of temporal bone |
| **Action** | Extends and rotates head |
| **Nerve** | Dorsal primary divisions of middle and lower cervical nerves |

# ERECTOR SPINAE

## SPINALIS THORACIS

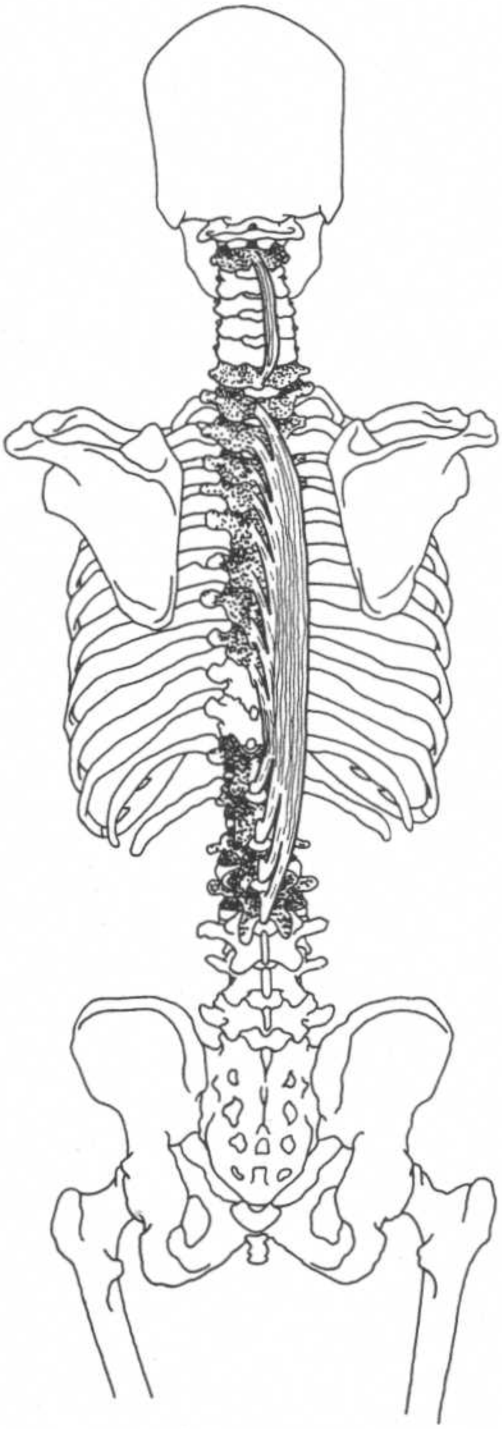
| | |
|---|---|
| **Origin** | Spinous processes of lower two thoracic (T11, T12) and upper two lumbar (L1, L2) vertebrae |
| **Insertion** | Spinous processes of upper thoracic vertebrae (T1–T8) |
| **Action** | Extends vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## SPINALIS CERVICIS

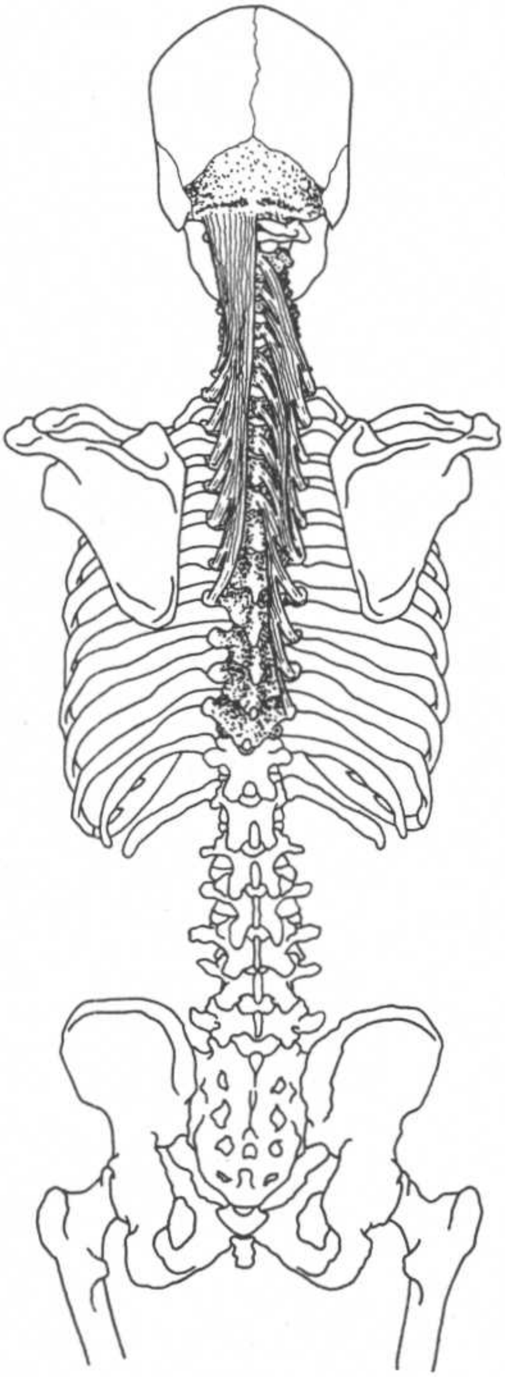
| | |
|---|---|
| **Origin** | Ligamentum nuchae, spinous process of seventh cervical vertebra |
| **Insertion** | Spinous process of axis |
| **Action** | Extends vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## SPINALIS CAPITIS

*(Medial part of semispinalis capitis)*



**Trunk—dorsal view**



Trunk—dorsal view

# TRANSVERSOSPINALIS*

## SEMISPINALIS THORACIS

| | |
|---|---|
| **Origin** | Transverse processes of the sixth through tenth thoracic vertebrae (T6–T10) |
| **Insertion** | Spinous processes of the lower two cervical (C6, C7) and upper four thoracic (T1–T4) vertebrae |
| **Action** | Extends and rotates vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## SEMISPINALIS CERVICIS

| | |
|---|---|
| **Origin** | Transverse processes of upper five or six thoracic vertebrae (T1–T6) |
| **Insertion** | Spinous processes of second to fifth cervical vertebrae (C2–C5) |
| **Action** | Extends and rotates vertebral column |
| **Nerve** | Dorsal primary divisions of spinal nerves |

## SEMISPINALIS CAPITIS

*(Medial part is spinalis capitis)*

| | |
|---|---|
| **Origin** | Transverse processes of lower four cervical (C4–C7) and upper six or seven thoracic (T1–T7) vertebrae |
| **Insertion** | Between superior and inferior nuchal lines of occipital bone |
| **Action** | Extends and rotates head |
| **Nerve** | Dorsal primary divisions of spinal nerves |

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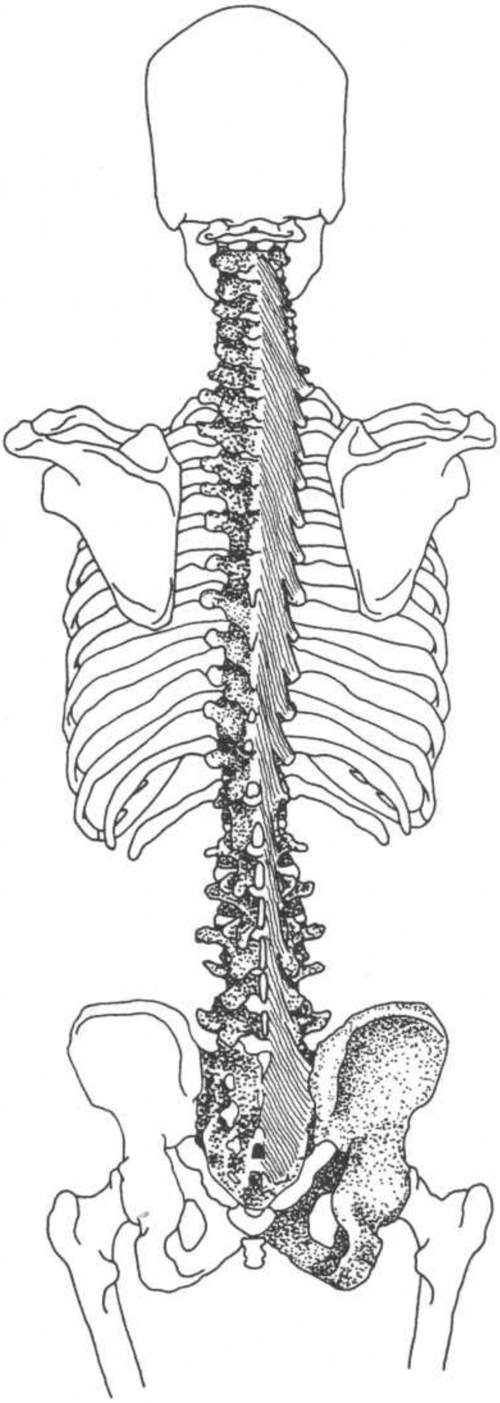
*The transversospinalis is composed of groups of small muscles generally extending upward from transverse processes to spinous processes of higher vertebrae. They are deep to erector spinae. They include semispinalis, multifidi, and rotatores.

## MULTIFIDIS*

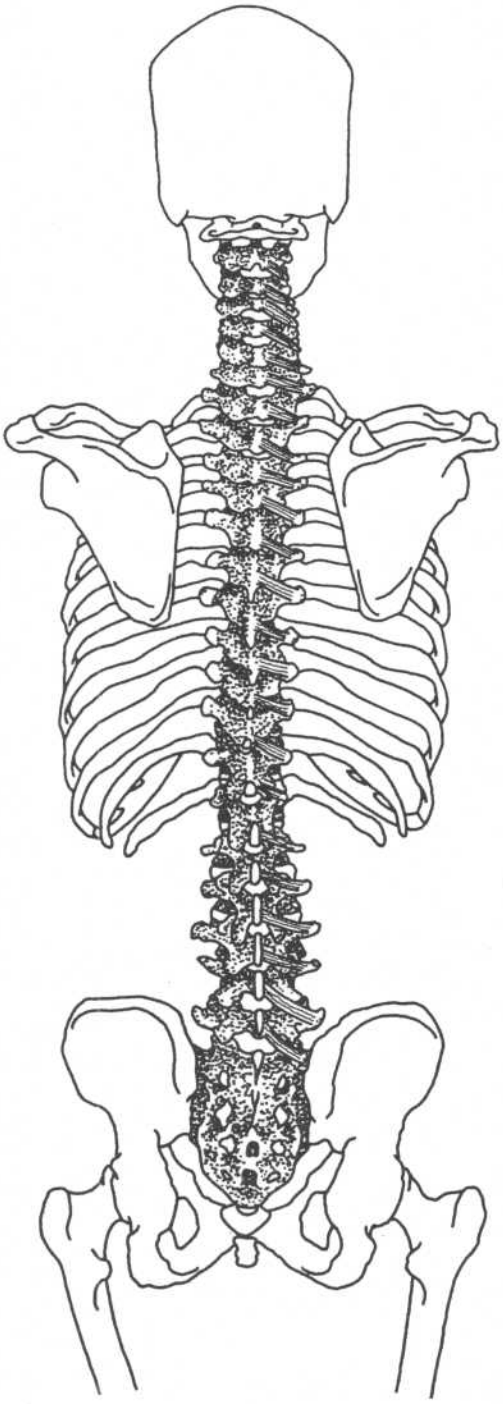
| | |
|---|---|
| **Origin** | Sacral region—along sacral foramina up to posterior superior iliac spine<br>Lumbar region—mamillary processes† of vertebrae<br>Thoracic region—transverse processes<br>Cervical region—articular processes of lower four vertebrae (C4–C7) |
| **Insertion** | Spinous process two to four vertebrae superior to origin |
| **Action** | Extend and rotate vertebral column |
| **Nerve** | Dorsal primary division of spinal nerves |

*Part of transversospinalis.

†Posterior border of superior articular process.



**Trunk—dorsal view**



Trunk—dorsal view

# ROTATORES*

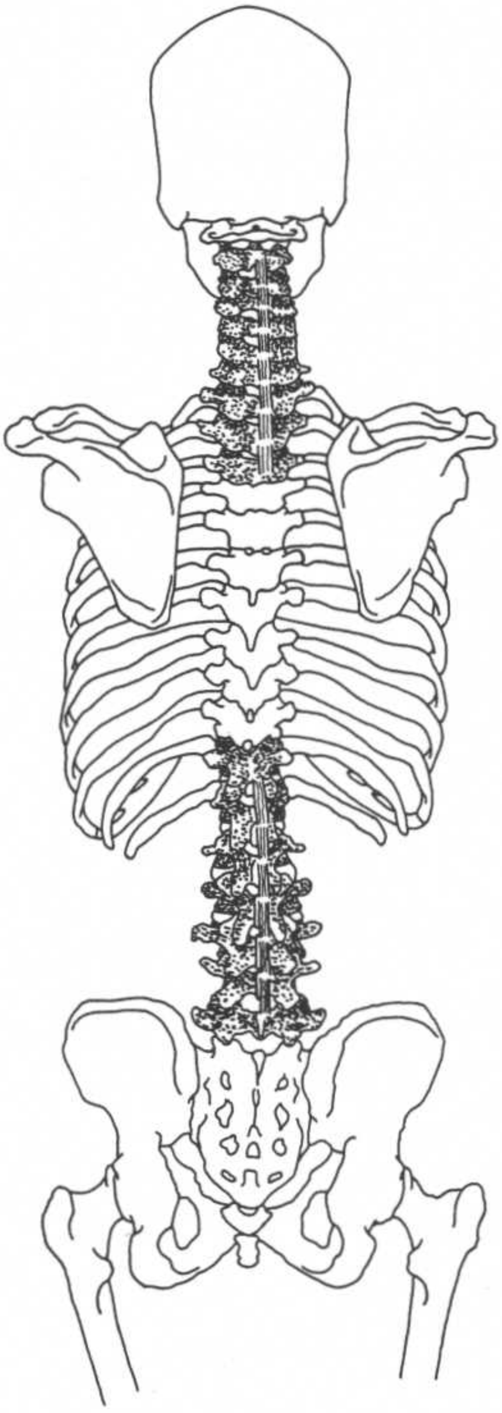
| | |
|---|---|
| **Origin** | Transverse process of each vertebra |
| **Insertion** | Base of spinous process of next vertebra above |
| **Action** | Extend and rotate vertebral column |
| **Nerve** | Dorsal primary division of spinal nerves |

*Part of transversospinalis.

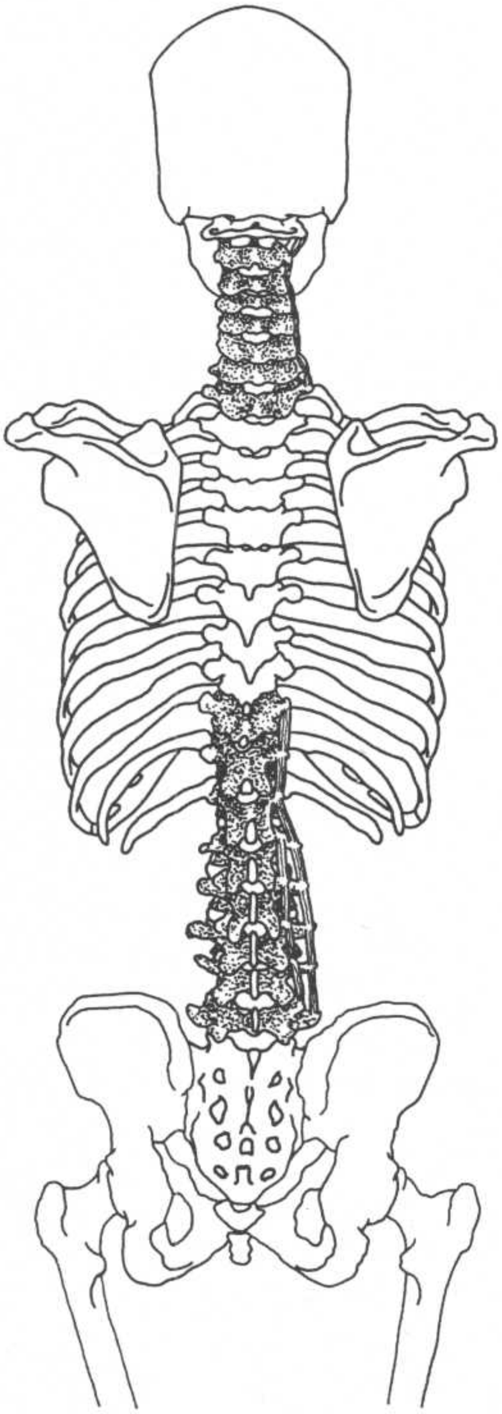
# INTERSPINALES

*(Paired on either side of interspinal ligament)*

| | |
|---|---|
| **Origin** | Cervical region—spinous processes of third to seventh cervical vertebrae (C3–C7)<br>Thoracic region—spinous processes of second to twelfth thoracic vertebrae (T2–T12)<br>Lumbar region—spinous processes of second to fifth lumbar vertebrae (L2–L5) |
| **Insertion** | Spinous process of next vertebra superior to origin |
| **Action** | Extend vertebral column |
| **Nerve** | Dorsal primary division of spinal nerves |



**Trunk—dorsal view**



Trunk—dorsal view

# INTERTRANSVERSARII

**Cervical region**

## INTERTRANSVERSARII ANTERIORES

| | |
|---|---|
| **Origin** | Anterior tubercle of transverse processes of vertebrae from first thoracic to axis |
| **Insertion** | Anterior tubercle of next superior vertebra |
| **Action** | Lateral flexion of vertebral column |
| **Nerve** | Ventral primary division of spinal nerves |

## INTERTRANSVERSARII POSTERIORES

| | |
|---|---|
| **Origin** | Posterior tubercle of transverse processes of vertebrae from first thoracic to axis |
| **Insertion** | Posterior tubercle of next superior vertebra |

**Thoracic region**

| | |
|---|---|
| **Origin** | Transverse processes of first lumbar to eleventh thoracic vertebrae |
| **Insertion** | Transverse processes of next superior vertebra |

**Lumbar region**

## INTERTRANSVERSARII LATERALES

| | |
|---|---|
| **Origin** | Transverse processes of lumbar vertebrae |
| **Insertion** | Transverse process of next superior vertebra |
| **Action** | Lateral flexion of vertebral column |
| **Nerve** | Ventral primary division of spinal nerves |

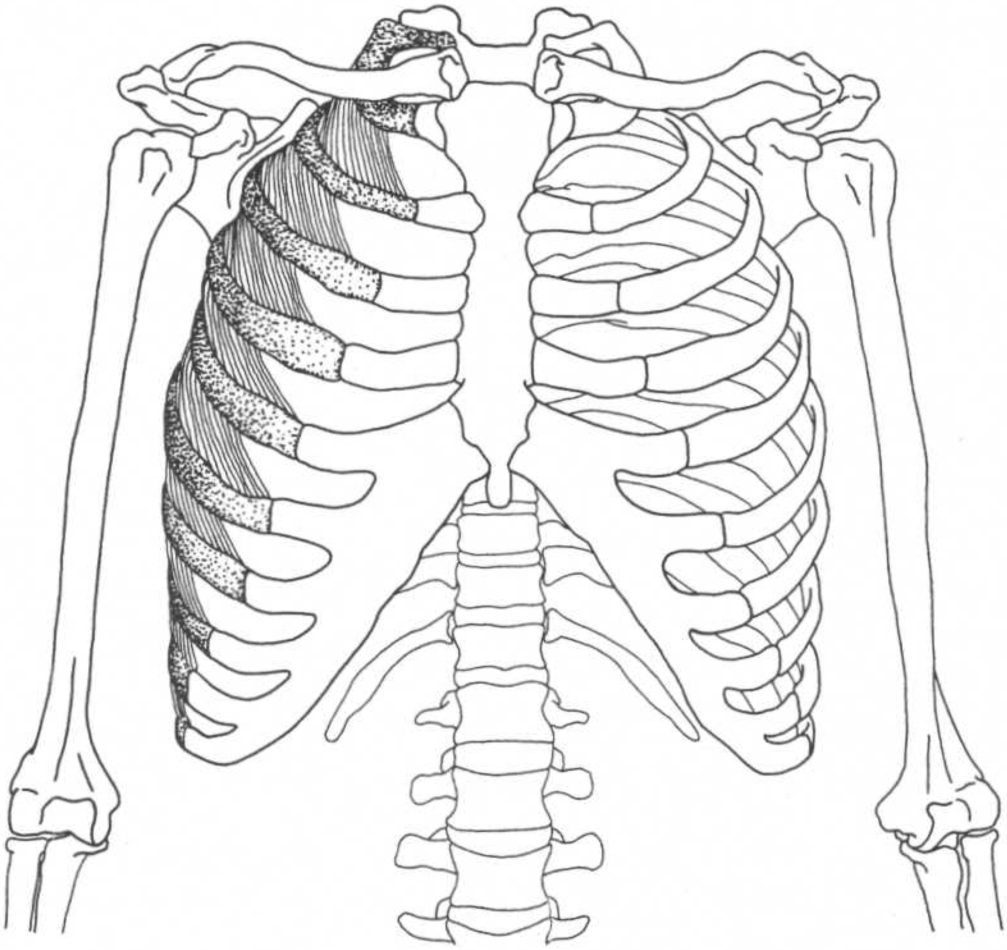
## INTERTRANSVERSARII MEDIALES

| | |
|---|---|
| **Origin** | Mamillary process[†] of each lumbar vertebra |
| **Insertion** | Accessory process of the next superior lumbar vertebra |
| **Action** | Lateral flexion of vertebral column |
| **Nerve** | Dorsal primary division of spinal nerves |

[†] Posterior border of superior articular process.

# INTERCOSTALES EXTERNI

*(External Intercostal)*

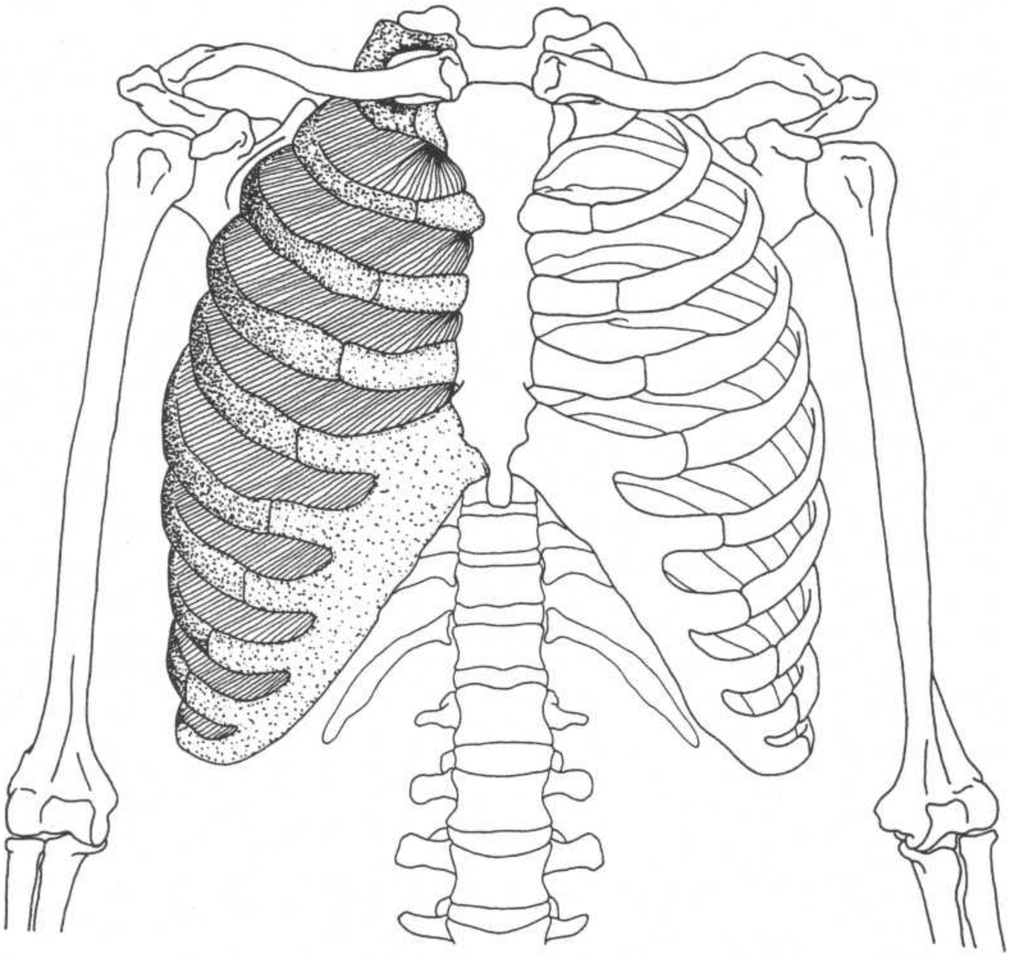


## Trunk—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Lower margin of upper eleven ribs | **Action** | Draw ventral part of ribs upward, increasing the volume of the thoracic cavity for inspiration |
| **Insertion** | Superior border of rib below (each muscle fiber runs obliquely and inserts toward the costal cartilage) | **Nerve** | Intercostal nerves |

# INTERCOSTALES INTERNI

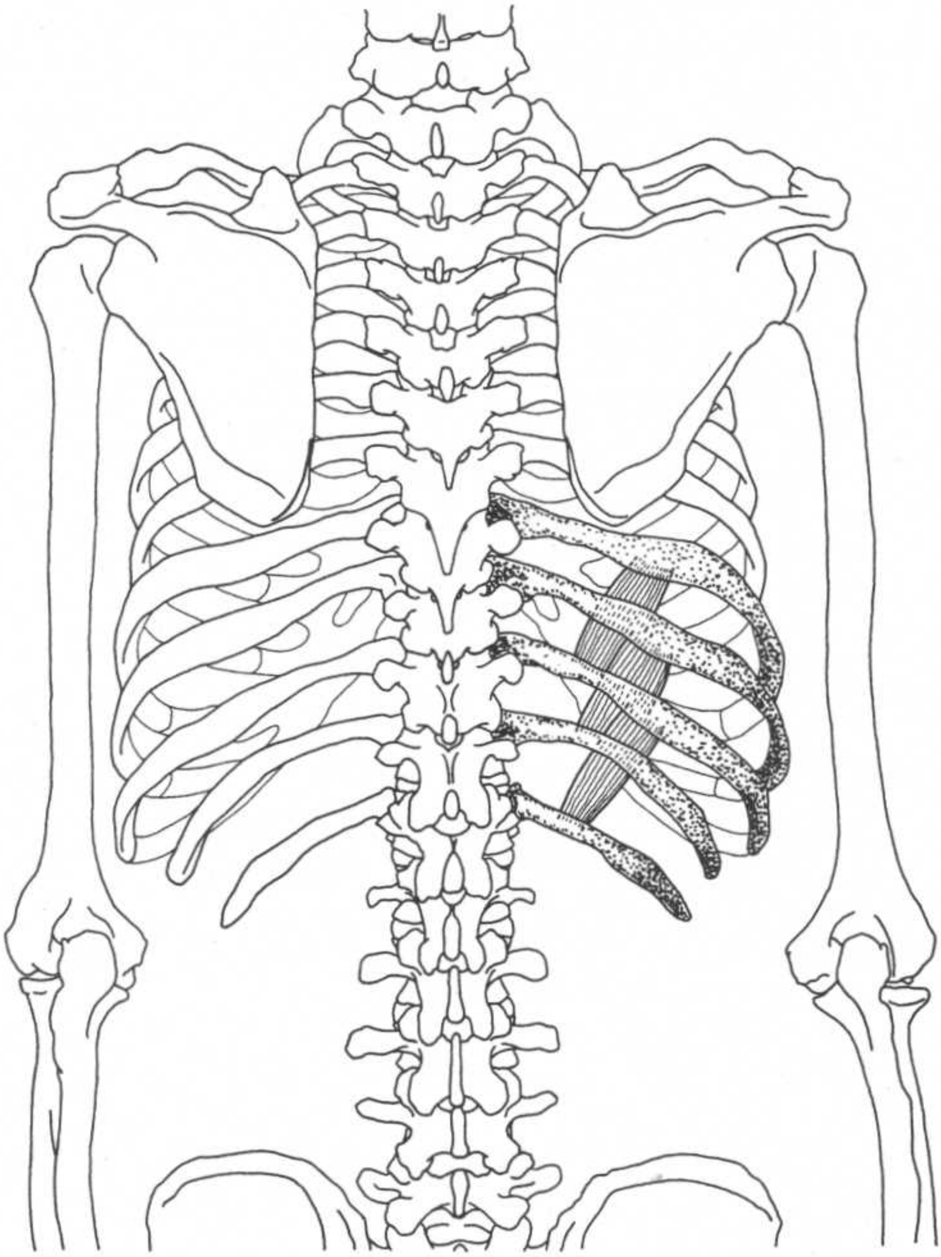
*(Internal Intercostal)*



## Trunk—anterior view

| | | | |
|---|---|---|---|
| **Origin** | From the cartilages to the angles of the upper eleven ribs | **Action** | Draw ventral part of ribs downward, decreasing the volume of the thoracic cavity for expiration |
| **Insertion** | Superior border of the rib below (each muscle fiber runs obliquely and inserts away from the costal cartilage) | **Nerve** | Intercostal nerves |

# SUBCOSTALES

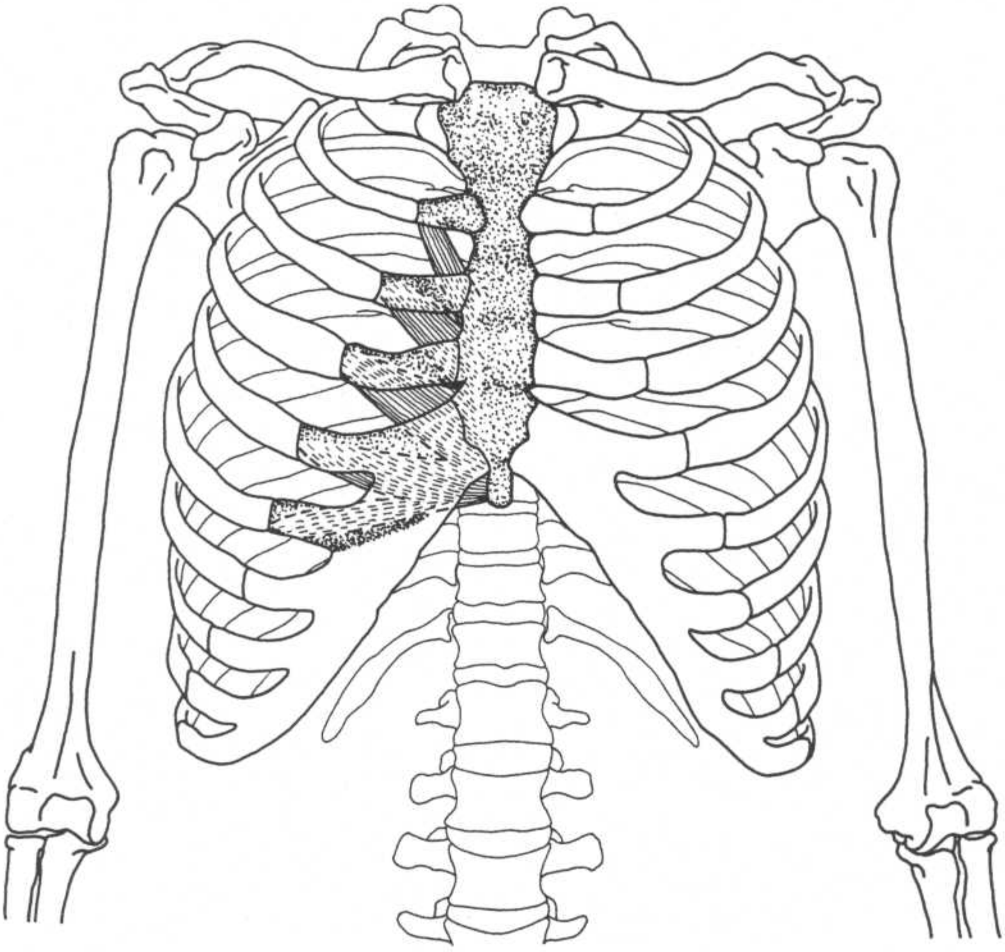


Trunk—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Inner surface of each rib near its angle | **Action** | Draw ventral part of ribs downward, decreasing the volume of the thoracic cavity for forceful expiration |
| **Insertion** | Medially on the inner surface of second or third rib below | **Nerve** | Intercostal nerves |

Note: These muscles are deep to the internal intercostals. They continue distally between single ribs, where they are known as innermost intercostal muscles.

# TRANSVERSUS THORACIS

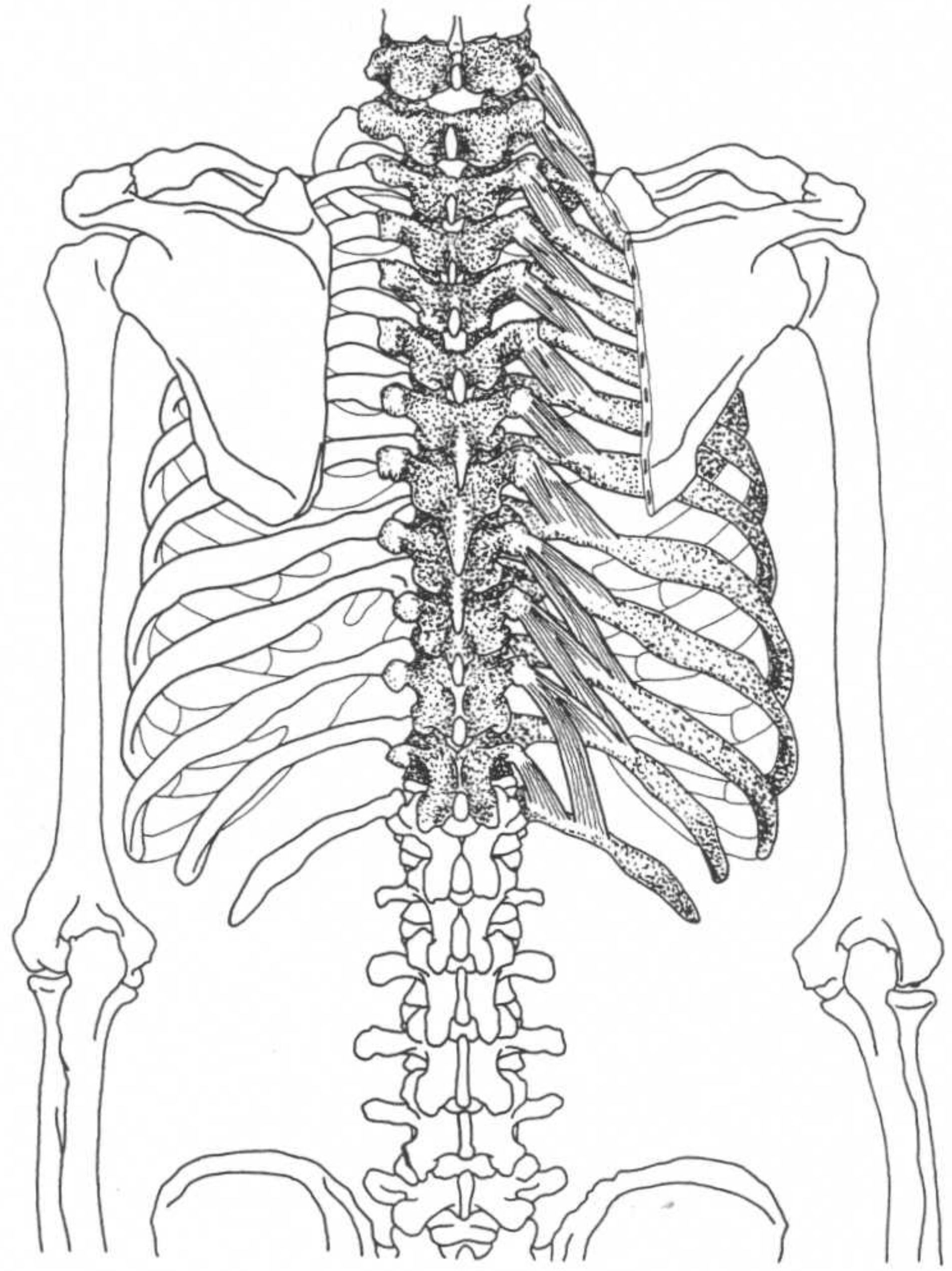


Trunk—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Inner surface of lower portion of sternum and adjacent costal cartilages | **Action** | Draws ventral part of ribs downward, decreasing the volume of the thoracic cavity for forceful expiration |
| **Insertion** | Inner surfaces of costal cartilages of the second through sixth ribs | **Nerve** | Intercostal nerves |

Note: These muscles are deep to the internal intercostal muscles.

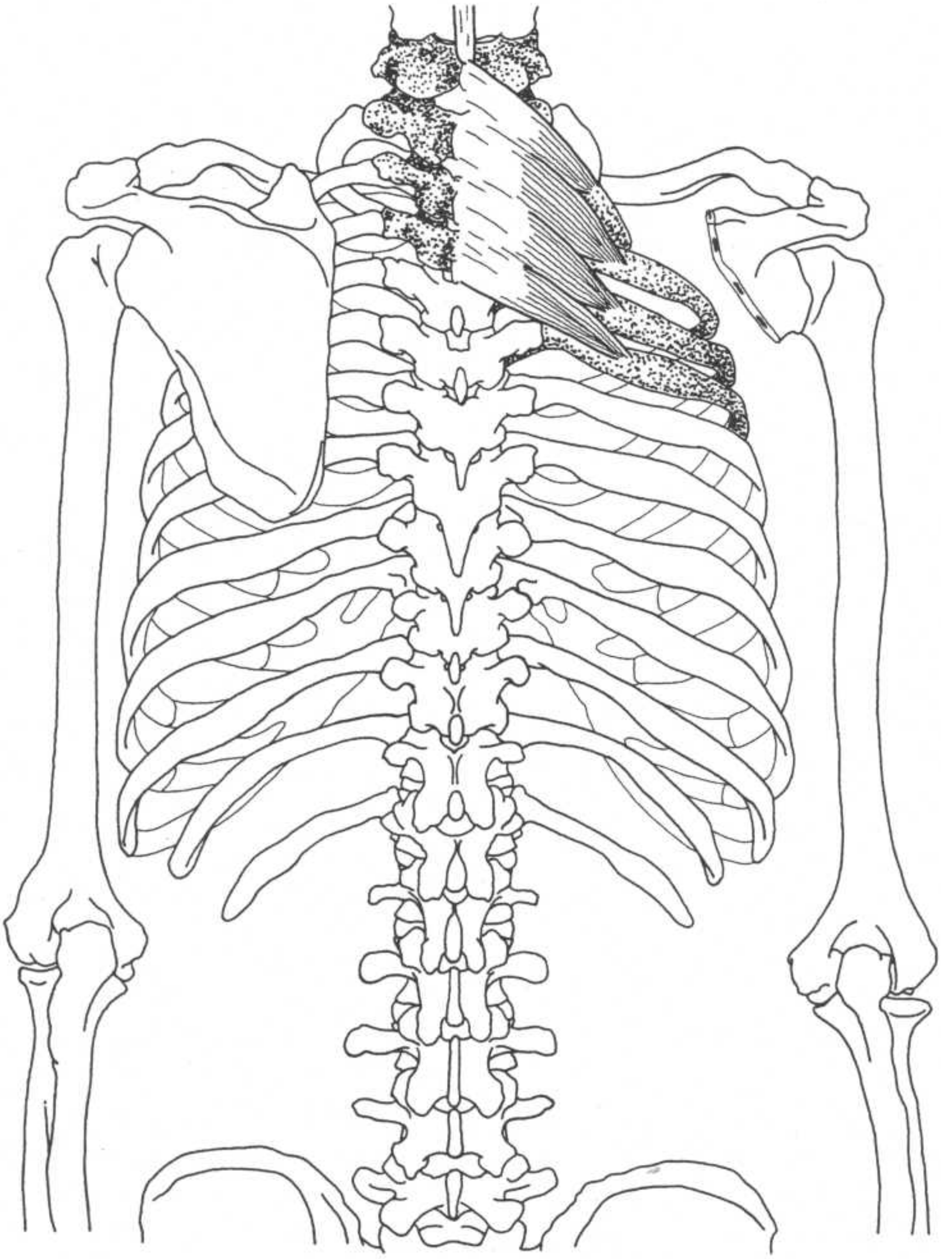
# LEVATORES COSTARUM



Trunk—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Transverse processes of the seventh cervical and the upper eleven thoracic vertebrae | **Action** | Raises ribs; extends, laterally flexes, and rotates vertebral column |
| **Insertion** | Laterally to outer surface of next lower rib (lower muscles may cross over one rib) | **Nerve** | Intercostal nerves |

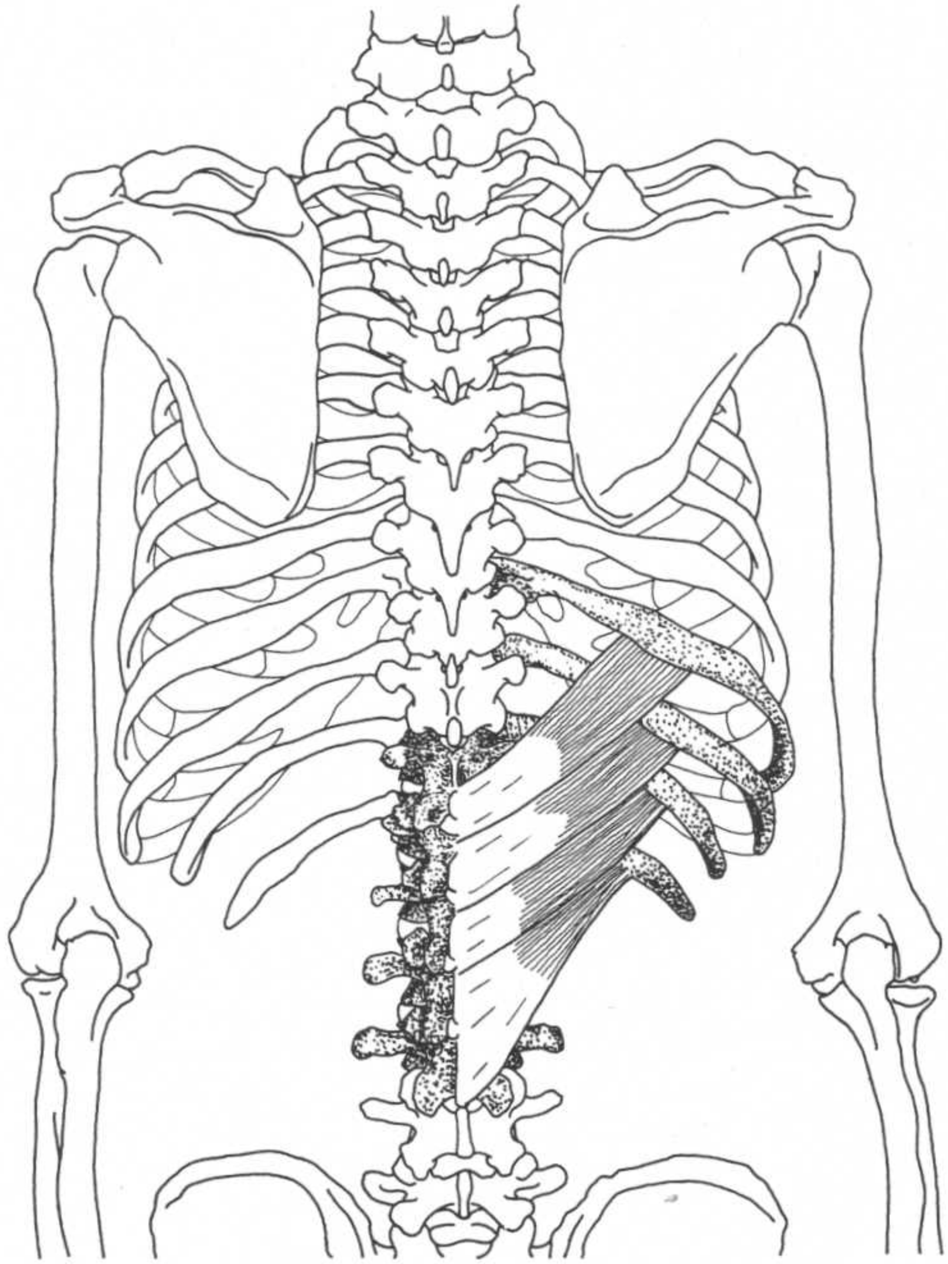
# SERRATUS POSTERIOR SUPERIOR



Trunk—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Ligamentum nuchae, spinous processes of seventh cervical and first few thoracic vertebrae | **Action** | Raises ribs in inspiration |
| **Insertion** | Upper borders of the second through fifth ribs lateral to their angles | **Nerve** | T1–T4 |

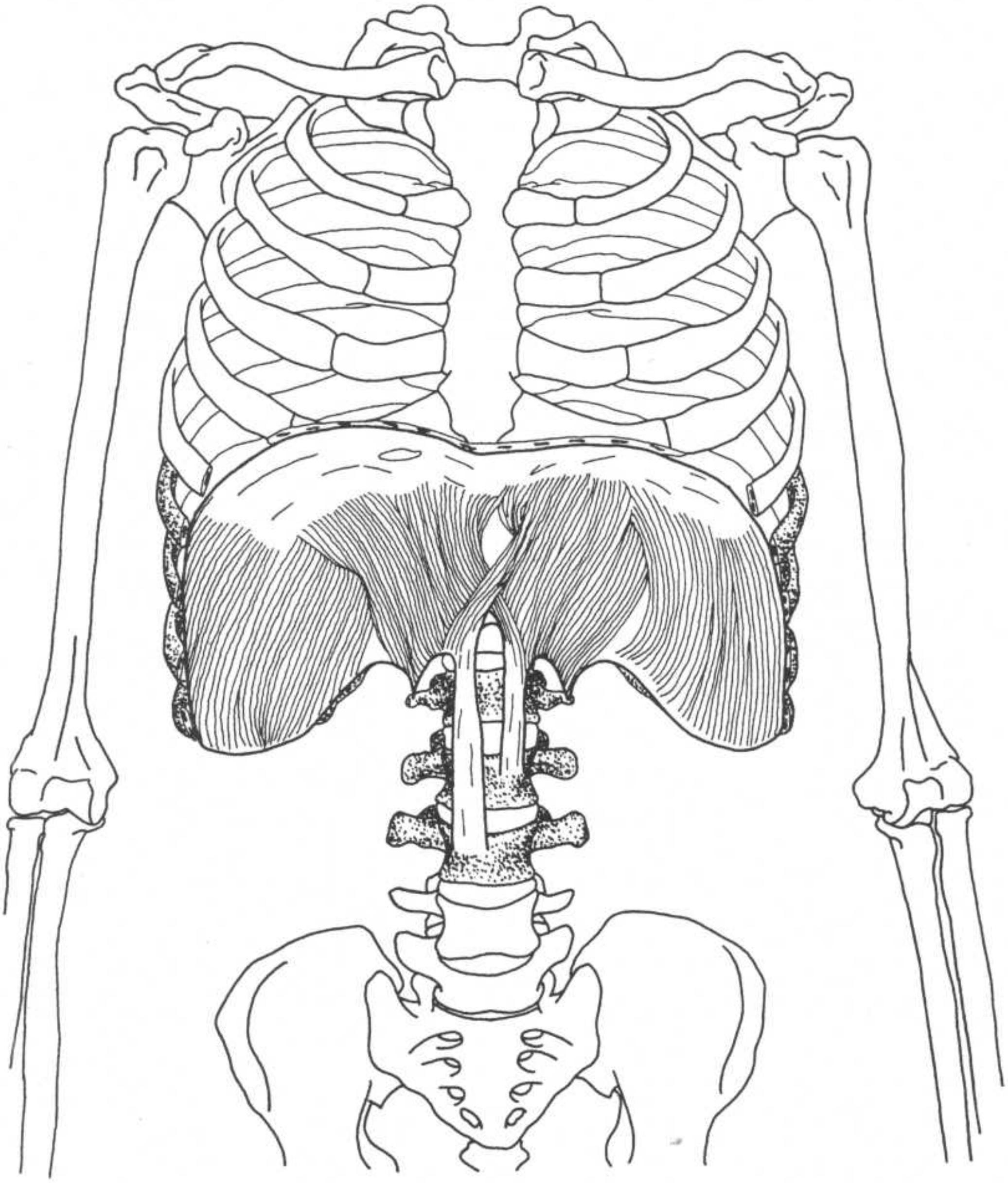
# SERRATUS POSTERIOR INFERIOR



Trunk—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Spinous processes of the lower two thoracic and the upper two or three lumbar vertebrae | **Action** | Pulls ribs down, resisting pull of diaphragm |
| **Insertion** | Lower borders of bottom four ribs | **Nerve** | T9–T12 |

# DIAPHRAGM



## Trunk—anterior view

*(Lower costal cartilages removed)*

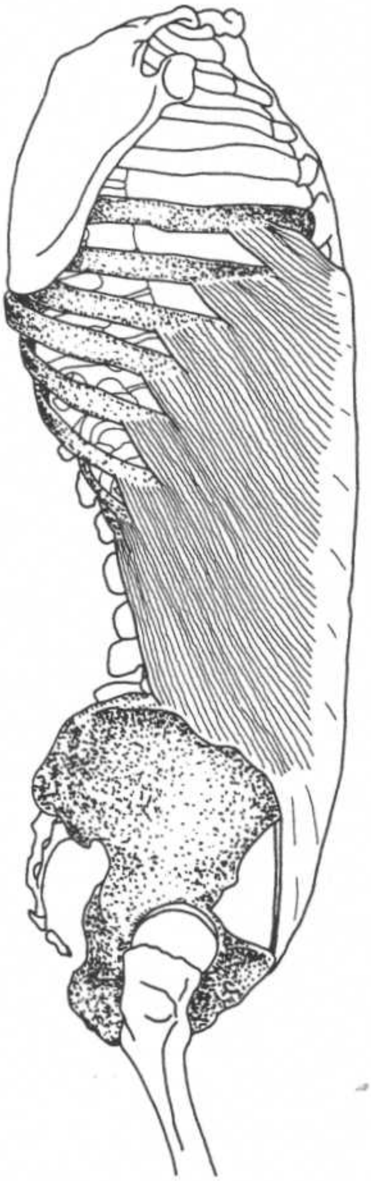
| | |
|---|---|
| **Origin** | Sternal part—inner part of xiphoid process<br>Costal part—inner surfaces of lower six ribs and their cartilages<br>Lumbar part—upper two or three lumbar vertebrae and lateral and medial lumbocostal arches* |
| **Insertion** | Fibers converge and meet on a central tendon |
| **Action** | Draws central tendon inferiorly |
| **Nerve** | Phrenic nerve (C3–C5) |

Note: This muscle inserts upon itself. Its action is to change the volume of the thoracic and abdominal cavities.

*These tendinous structures, also known as the medial and lateral arcuate ligaments, allow the diaphragm to bridge the upper parts of the psoas major and quadratus lumborum muscles.

# OBLIQUUS EXTERNUS ABDOMINIS

*(External Oblique)*



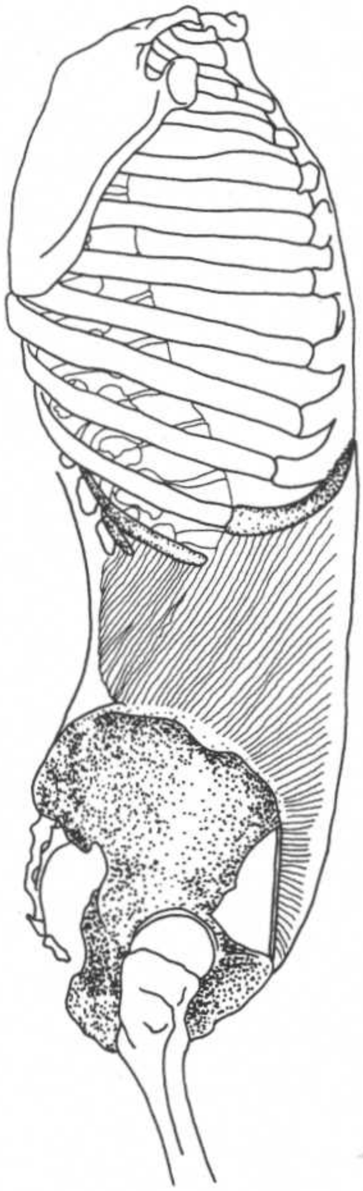
**Trunk—lateral view**

| | |
|---|---|
| **Origin** | Lower eight ribs |
| **Insertion** | Anterior part of iliac crest, abdominal aponeurosis to linea alba |
| **Action** | Compresses abdominal contents, laterally flexes and rotates vertebral column |
| **Nerve** | Eighth to twelfth intercostal, iliohypogastric, ilioinguinal nerves |
| **Relationships** | Most superficial of the three lateral abdominal muscles |

Note: Important in forced expiration, coughing, sneezing.

# OBLIQUUS INTERNUS ABDOMINIS

*(Internal Oblique)*

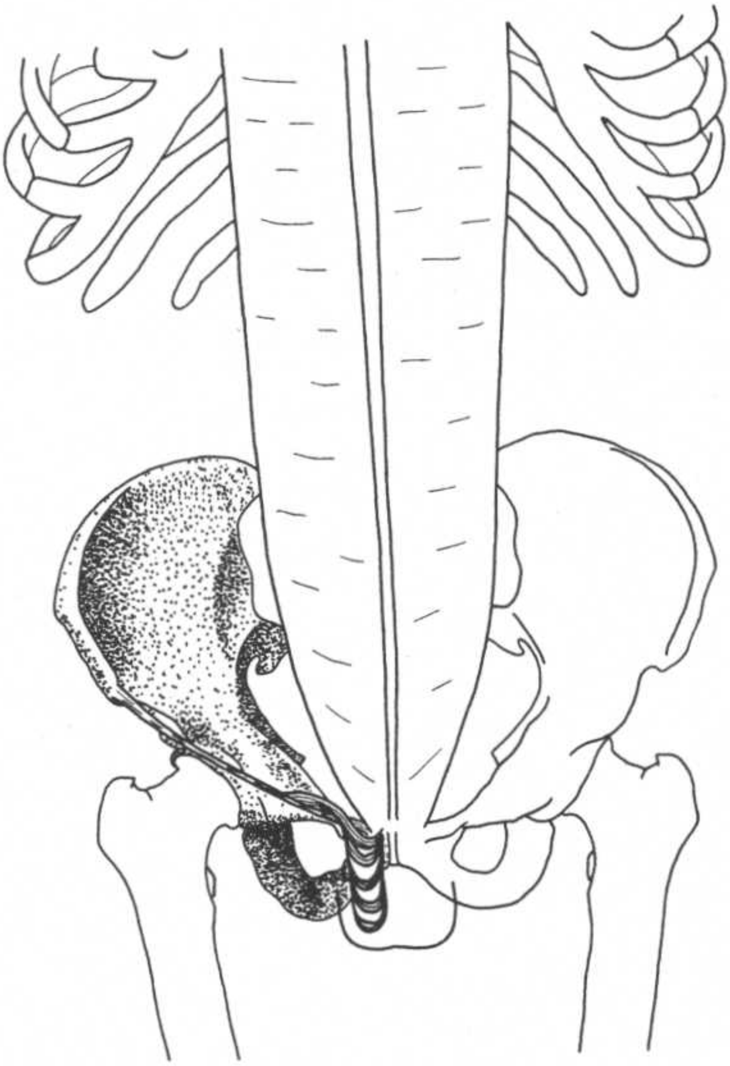


**Trunk—lateral view**

| | |
|---|---|
| **Origin** | Lateral half of inguinal ligament, iliac crest, thoracolumbar fascia |
| **Insertion** | Cartilage of bottom three or four ribs, abdominal aponeurosis to linea alba |
| **Action** | Compresses abdominal contents, laterally flexes and rotates vertebral column |
| **Nerve** | Eighth to twelfth intercostal, iliohypogastric, ilioinguinal nerves |
| **Relationships** | Middle layer of the three lateral abdominal muscles |

Note: Important in forced expiration, coughing, sneezing.

# CREMASTER

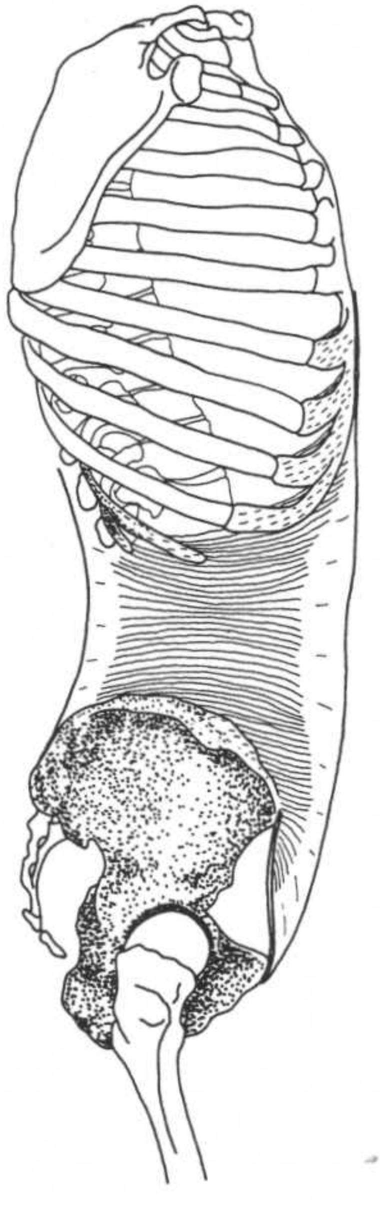


## Trunk—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Inguinal ligament | **Action** | Pulls testes toward body |
| **Insertion** | Pubic tubercle, crest of pubis, sheath of rectus abdominis | **Nerve** | Genital branch of genitofemoral nerve |

Note: The cremaster regulates the temperature of the testes, which is important for spermatogenesis.

# TRANSVERSUS ABDOMINIS



Trunk—lateral view

| | |
|---|---|
| **Origin** | Lateral part of inguinal ligament, iliac crest, thoracolumbar fascia, cartilage of lower six ribs |
| **Insertion** | Abdominal aponeurosis to linea alba |
| **Action** | Compresses abdomen |
| **Nerve** | Seventh to twelfth intercostal, iliohypogastric, ilioinguinal nerves |
| **Relationships** | Deepest of the three lateral abdominal muscles |

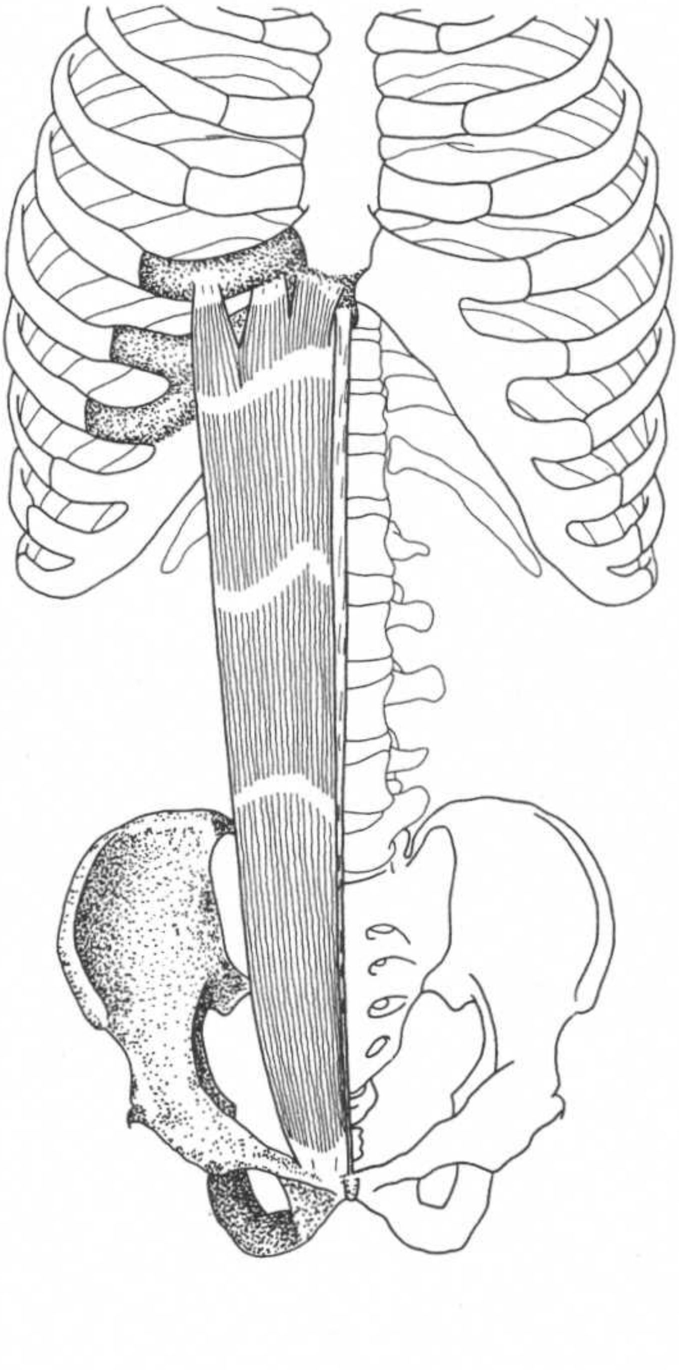
Note: Important in forced expiration, coughing, sneezing.

# RECTUS ABDOMINIS*

| | |
|---|---|
| **Origin** | Crest of pubis, pubic symphysis |
| **Insertion** | Cartilage of fifth, sixth, and seventh ribs, xiphoid process |
| **Action** | Flexes vertebral column, compresses abdomen |
| **Nerve** | Seventh through twelfth intercostal nerves |

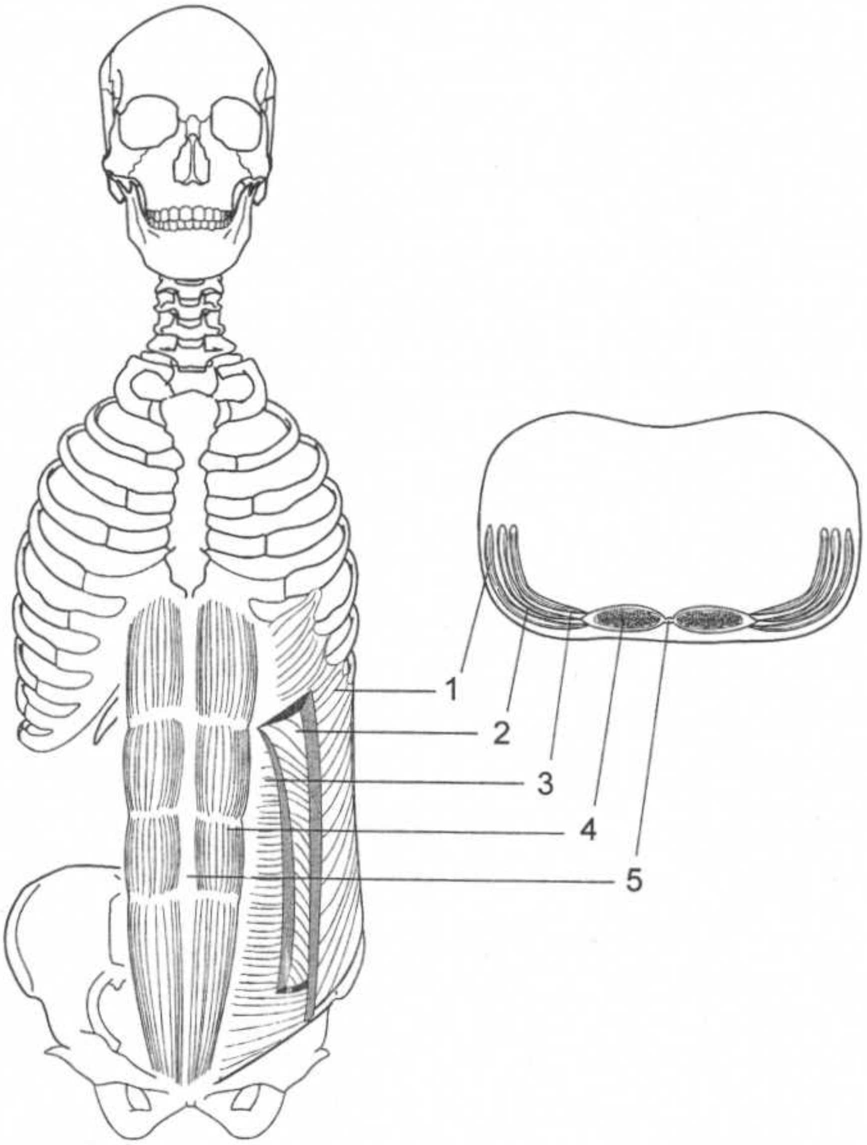
*Tendinous bands divide each rectus into three or four bellies. Each rectus is sheathed in aponeurotic fibers from the lateral abdominal muscles. These fibers meet centrally to form the linea alba.

Note: The pyramidalis is a small, unimportant muscle that extends from the ventral surface of the pubis to the lower part of the linea alba. It is frequently absent.



**Trunk—anterior view**

# ABDOMINAL MUSCLES

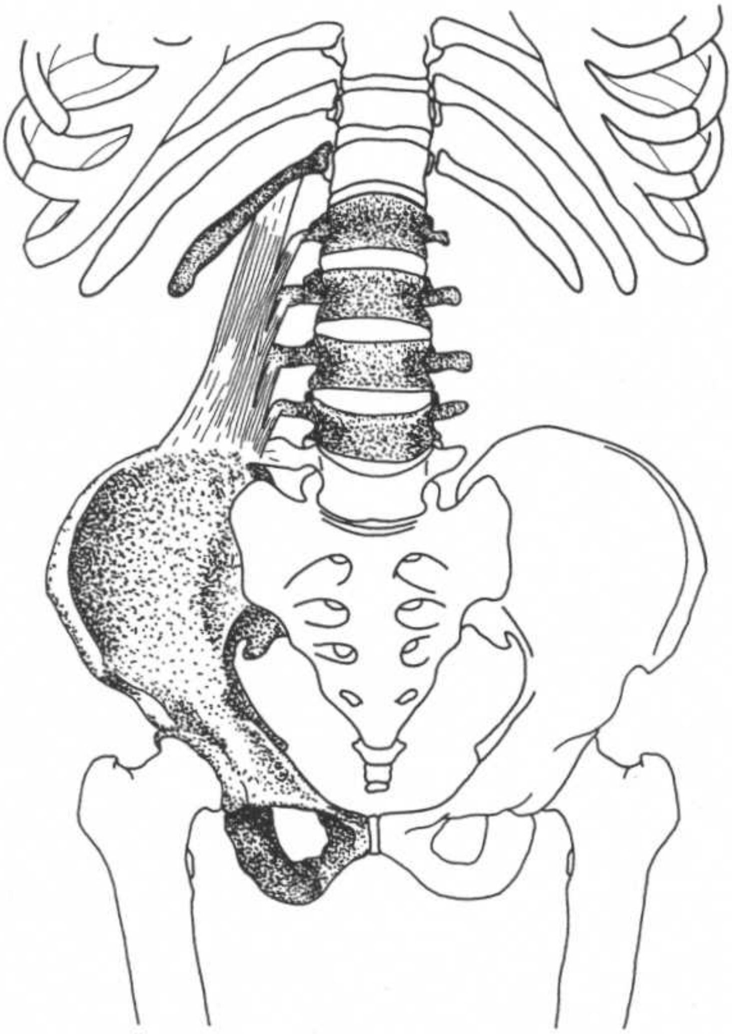


## Trunk—anterior and cross-sectional views

1. Obliquus externus abdominis
2. Obliquus internus abdominis
3. Transversus abdominis
4. Rectus abdominis
5. Linea alba

Note: The aponeuroses (tendons) of the three lateral abdominal muscles join to form the fascial sheath surrounding the rectus abdominis.

# QUADRATUS LUMBORUM



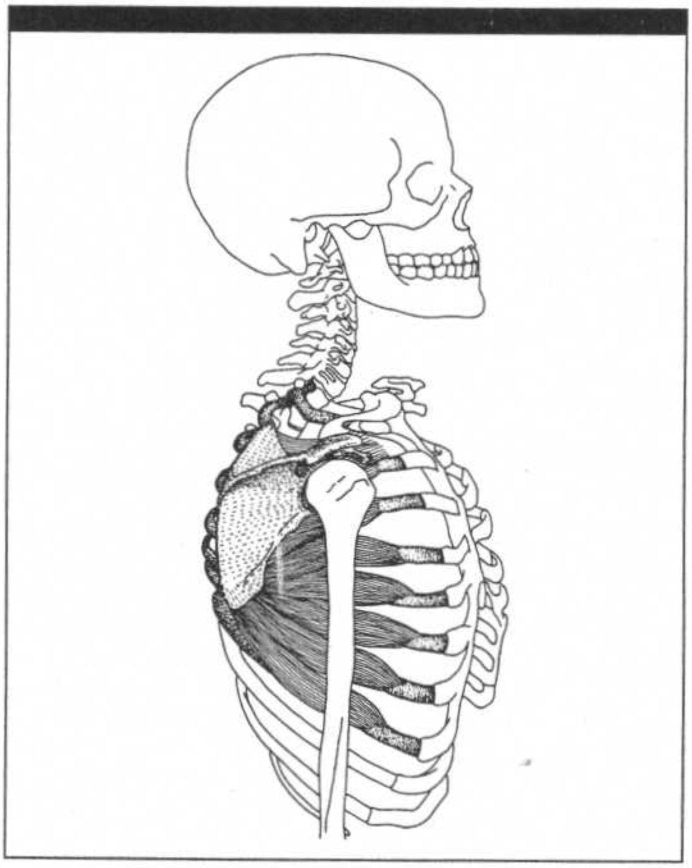
**Lower trunk—anterior view**

| | | | |
|---|---|---|---|
| **Origin** | Iliolumbar ligament, iliac crest | **Action** | Laterally flexes vertebral column, fixes ribs for forced expiration |
| **Insertion** | Twelfth rib, transverse processes of upper four lumbar vertebrae | **Nerve** | T12, L1 |

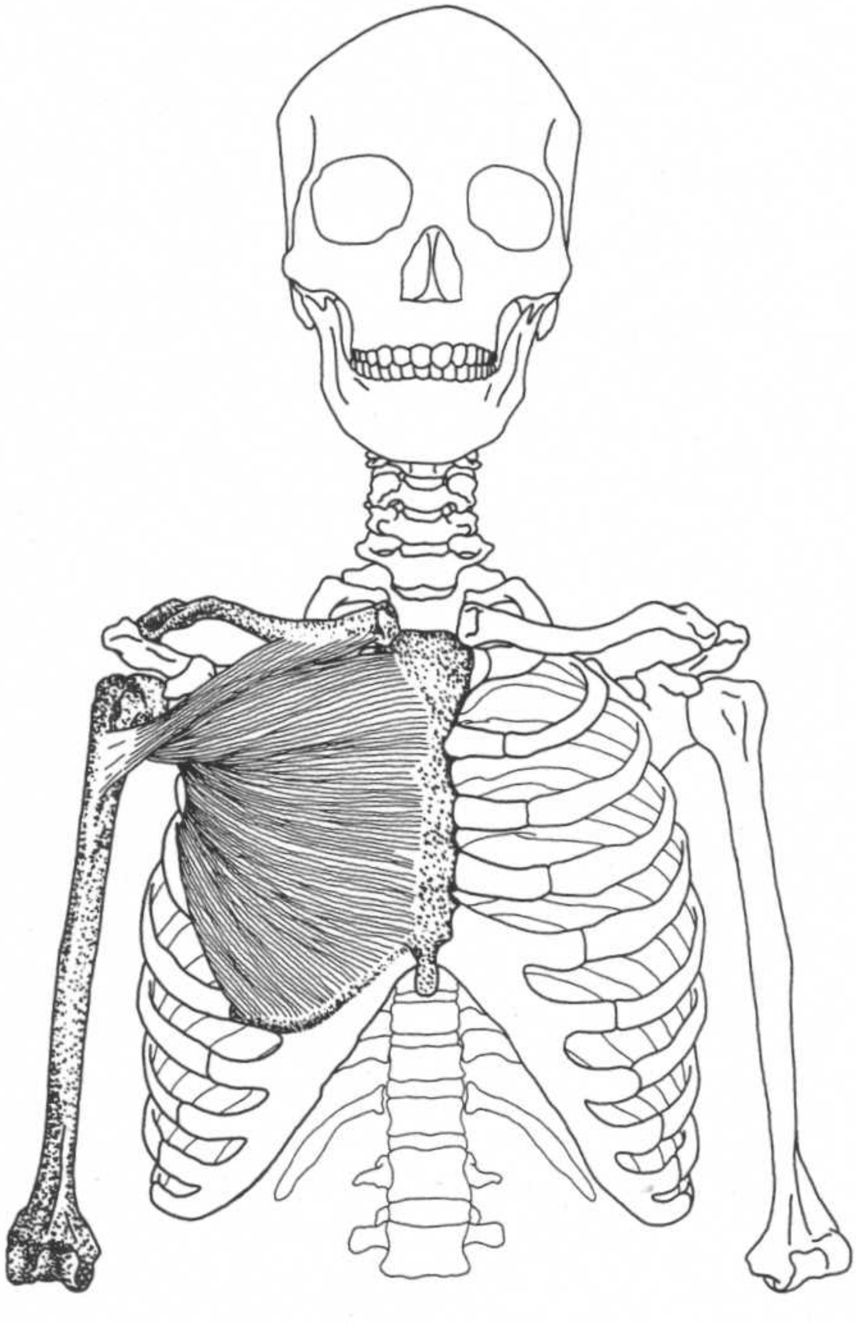
Note: Fixation of the ribs may provide a stable attachment of the diaphragm for voice control in singers.

# CHAPTER SIX

# MUSCLES OF THE SHOULDER AND ARM



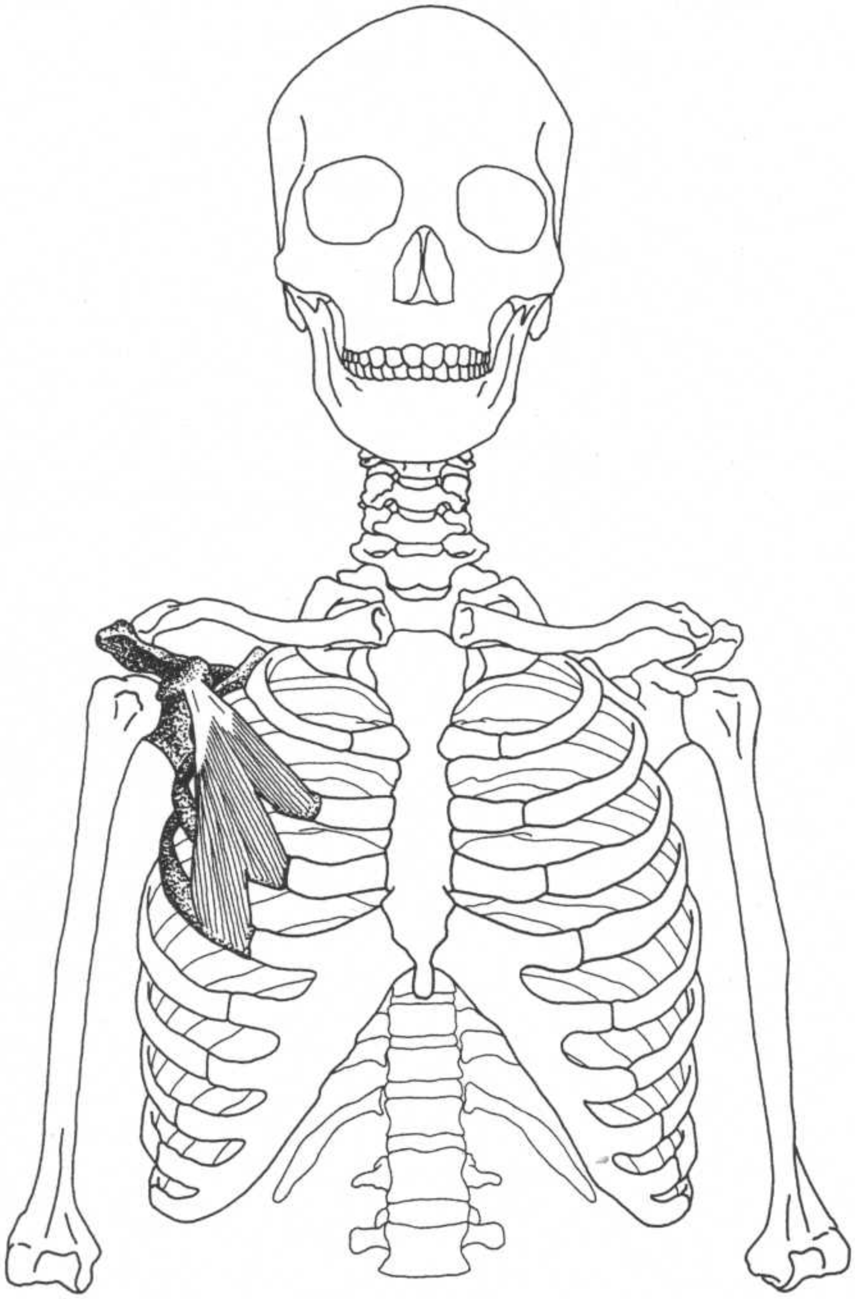
# PECTORALIS MAJOR



**Anterior view**

| | |
|---|---|
| **Origin** | Clavicular part—medial half of the clavicle<br>Sternocostal part—sternum, upper six costal cartilages, aponeurosis of external oblique |
| **Insertion** | Lateral lip of intertubercular (bicipital) groove of humerus, crest below greater tubercle of the humerus |
| **Action** | Both parts adduct, medially rotate arm; clavicular part flexes arm from full extension; sternocostal part extends the flexed arm |
| **Nerve** | Medial and lateral pectoral nerves (C5–C8, T1) |

# PECTORALIS MINOR

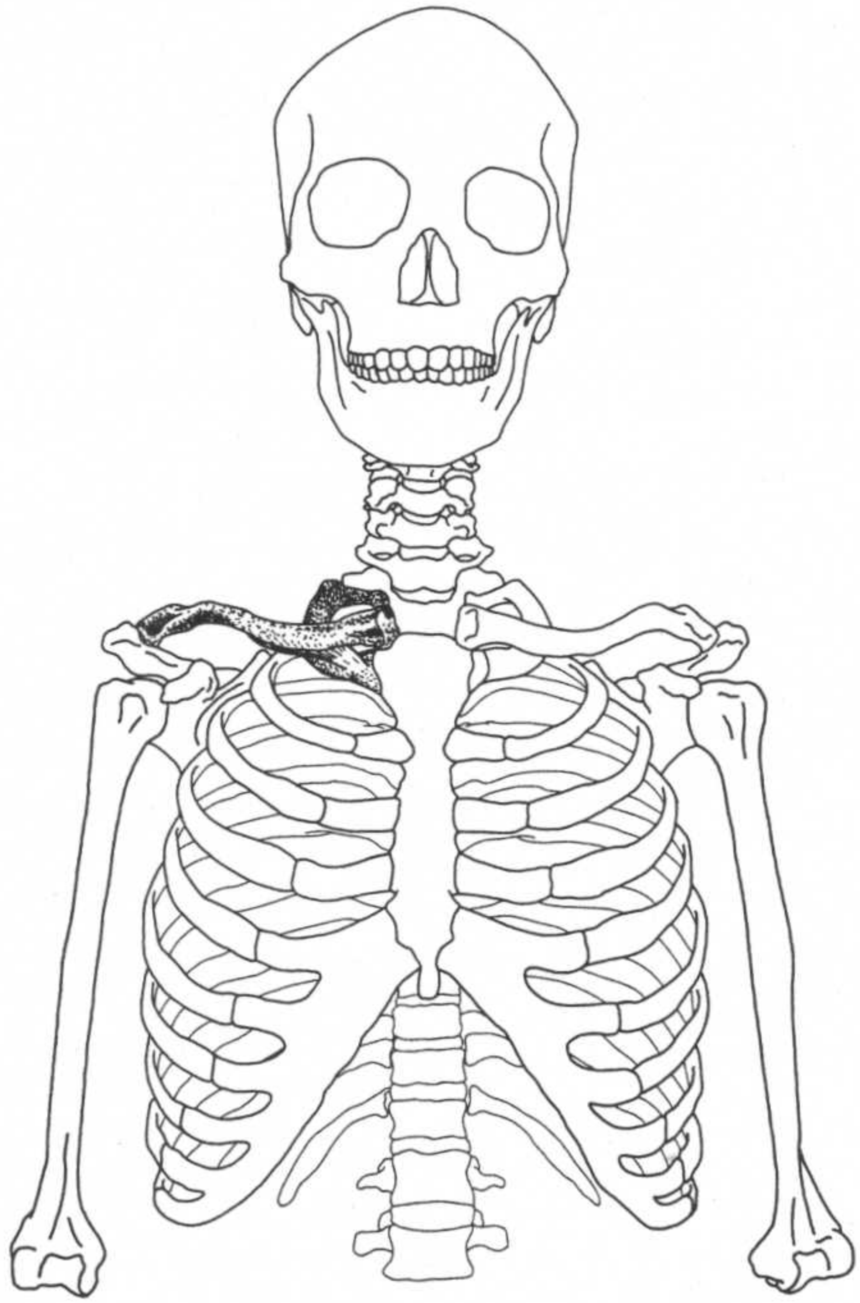


**Anterior view**

| | |
|---|---|
| **Origin** | External surfaces of the third, fourth, and fifth ribs |
| **Insertion** | Coracoid process of the scapula |
| **Action** | Draws scapula forward and downward, raises ribs* in forced inspiration |
| **Nerve** | Medial pectoral nerve (C8, T1) |
| **Relationships** | Deep to pectoralis major |

*Raising the ribs requires stabilization of the scapula by the rhomboids and trapezius.

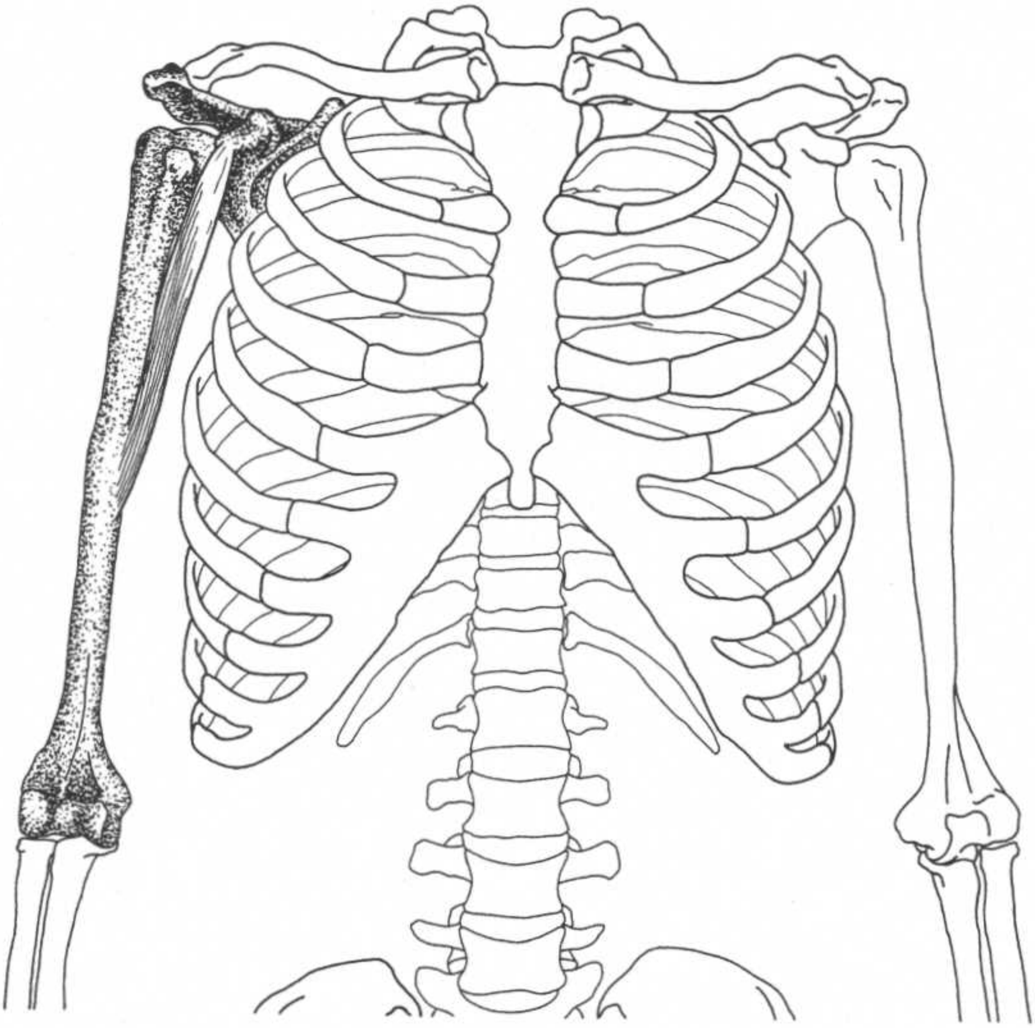
# SUBCLAVIUS



**Anterior view**

| | |
|---|---|
| **Origin** | Junction of the first rib with its costal cartilage |
| **Insertion** | Groove on the inferior (lower) surface of the clavicle |
| **Action** | Depresses clavicle, draws shoulder forward and downward, steadies clavicle during movements of shoulder girdle |
| **Nerve** | C5, C6 |

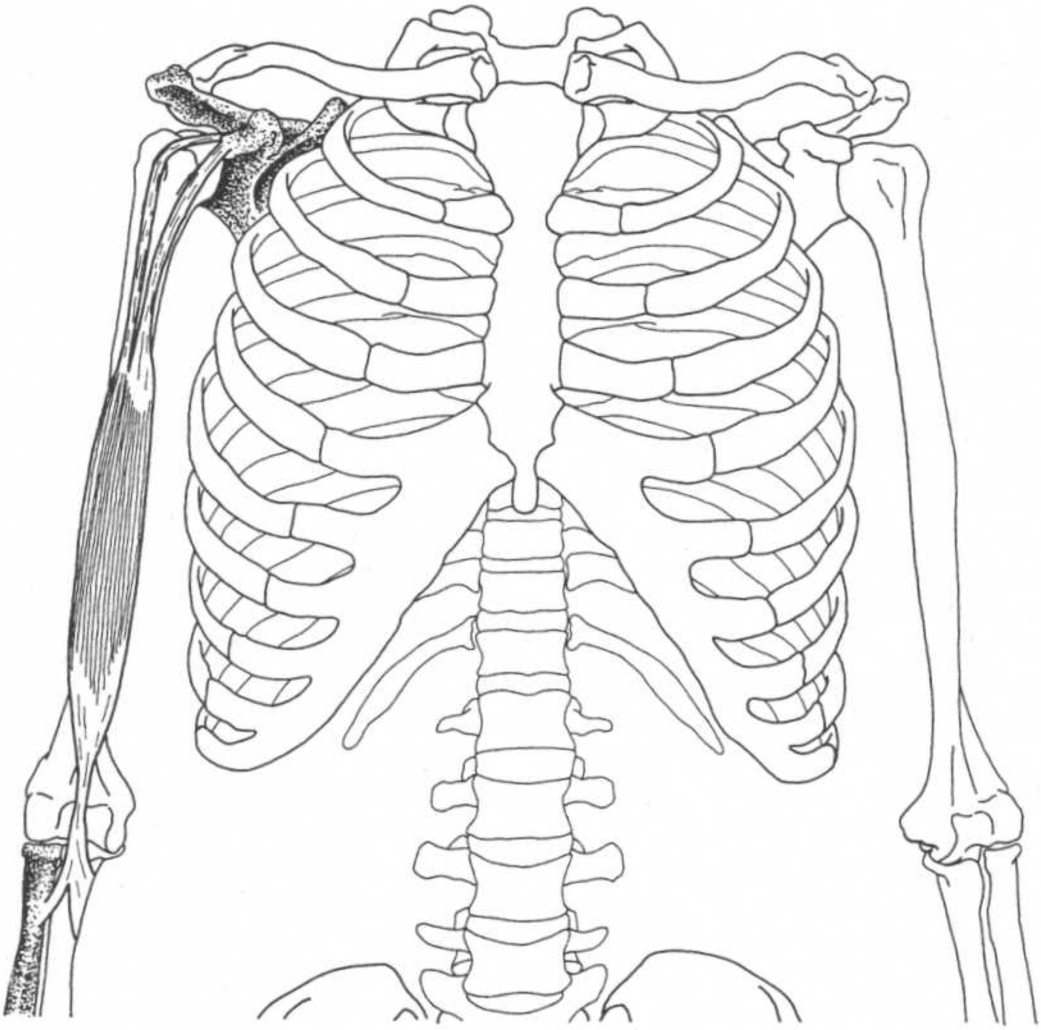
# CORACOBRACHIALIS



**Anterior view**

| | |
|---|---|
| **Origin** | Tip (apex) of the coracoid process of scapula |
| **Insertion** | Middle third of the medial surface and border of the humerus |
| **Action** | Weakly adducts arm (flexion unsubstantiated), aids in stabilizing humerus |
| **Nerve** | Musculocutaneous nerve (C6, C7) |
| **Relationships** | Deep to short head of biceps |

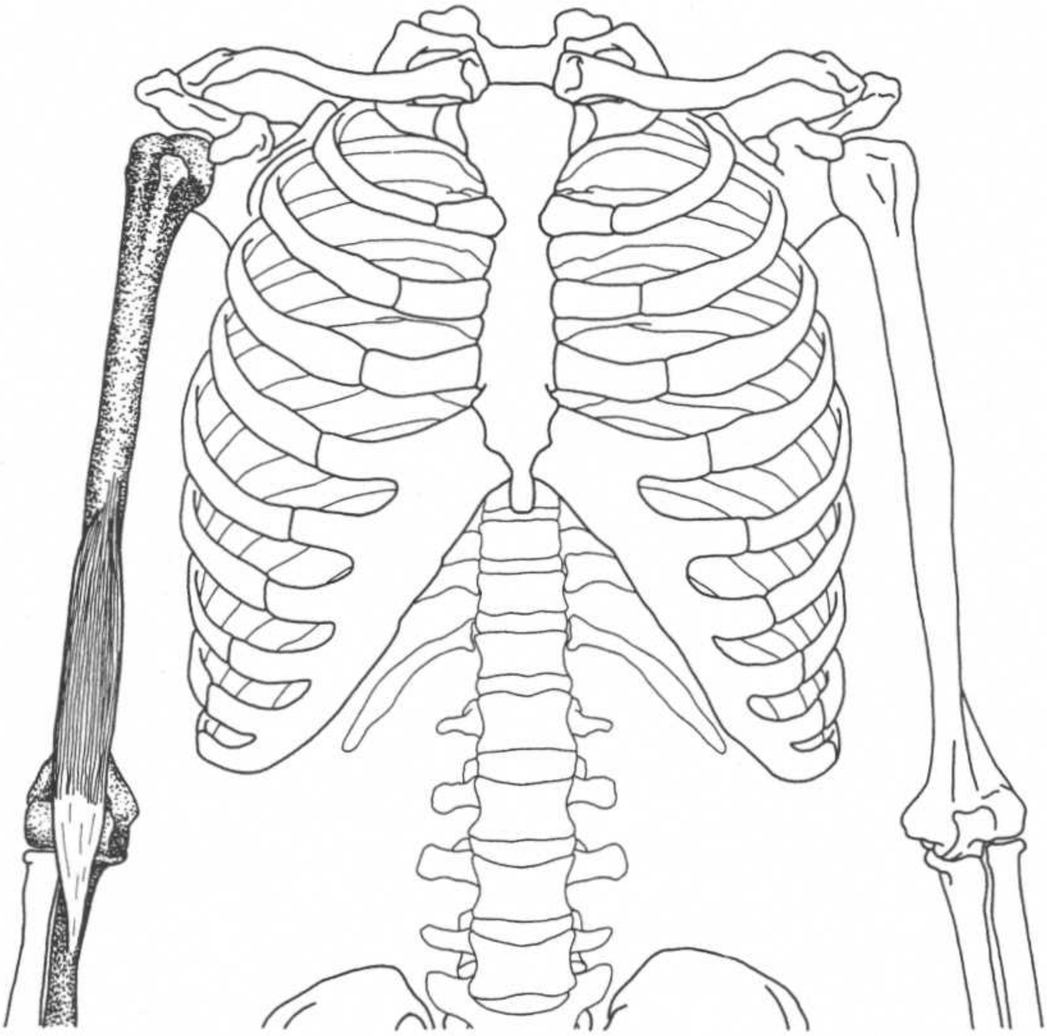
# BICEPS BRACHII



**Anterior view**

| | |
|---|---|
| **Origin** | Long head—supraglenoid tubercle of scapula<br>Short head—coracoid process of scapula |
| **Insertion** | Tuberosity of radius, bicipital aponeurosis into deep fascia on medial part of forearm |
| **Action** | Supinates forearm, flexes forearm, weakly flexes arm at shoulder |
| **Nerve** | Musculocutaneous nerve (C5, C6) |
| **Relationships** | Long head passes through intertubercular (bicipital) groove, then inside glenohumeral joint capsule |

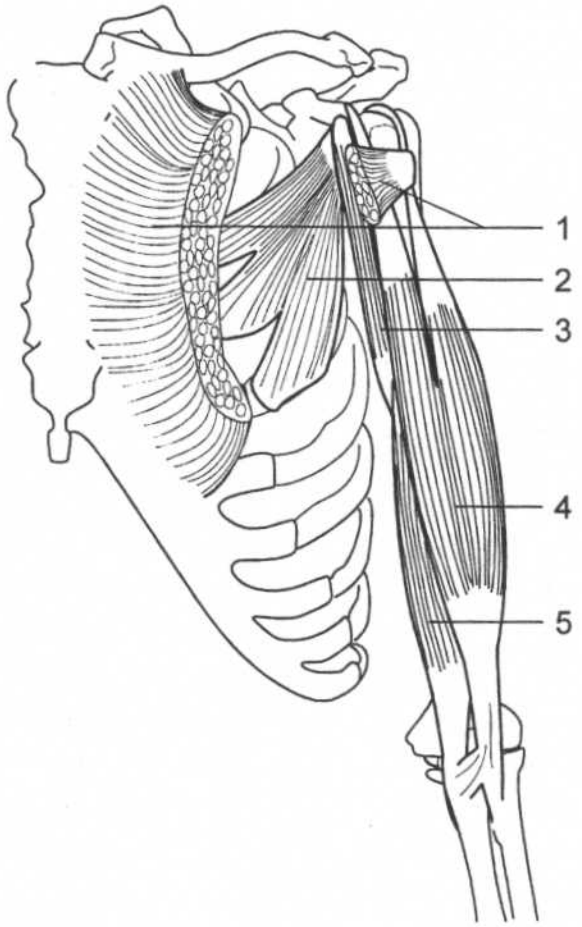
# BRACHIALIS



Anterior view

| | | | |
|---|---|---|---|
| **Origin** | Anterior of lower half of humerus | **Action** | Flexes forearm |
| **Insertion** | Coronoid process of ulna, tuberosity of ulna | **Nerve** | Musculocutaneous nerve (C5, C6) |
| | | **Relationships** | Deep to biceps brachii |

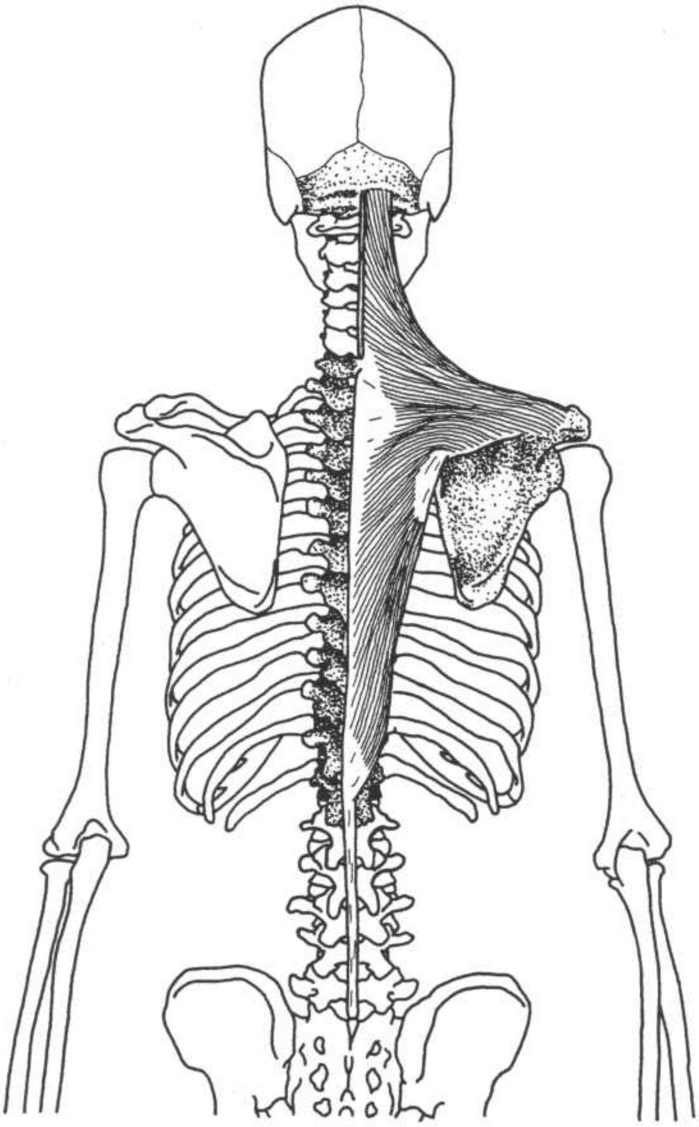
# MUSCLES OF THE ANTERIOR CHEST AND ARM



## Shoulder—anterior view

1. Pectoralis major (cut)
2. Pectoralis minor
3. Coracobrachialis
4. Biceps brachii
5. Brachialis

# TRAPEZIUS

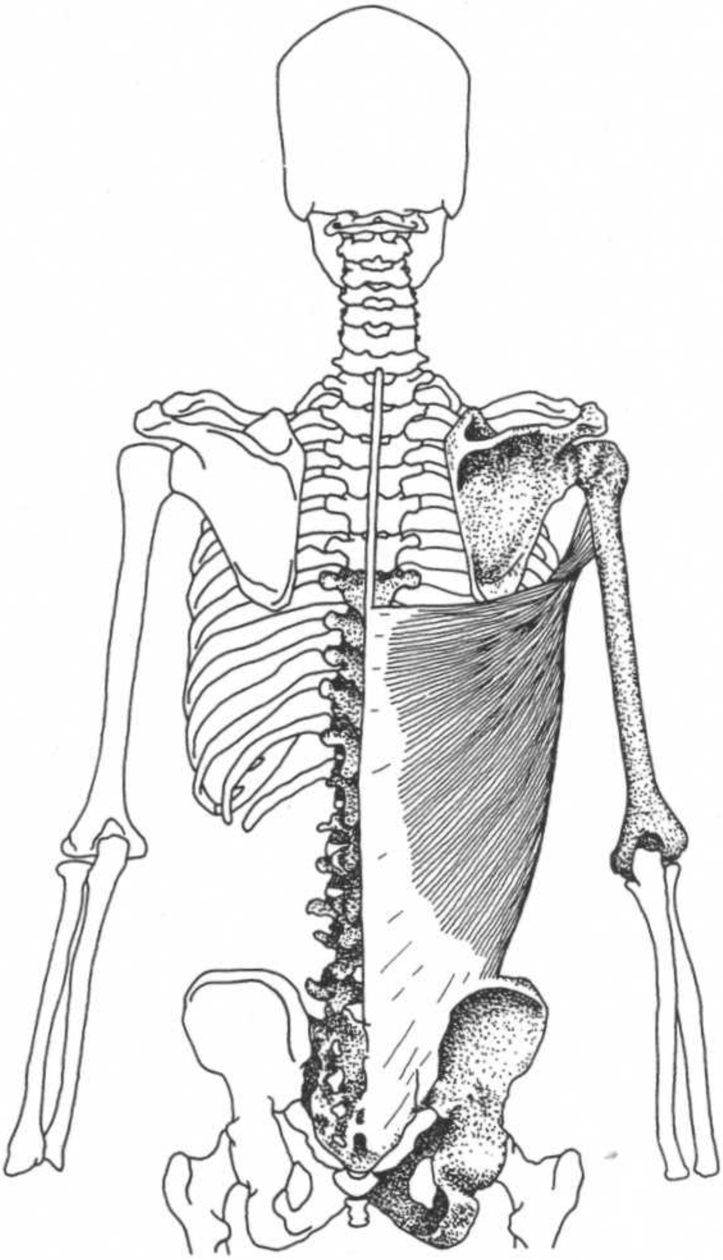


Posterior view

| | |
|---|---|
| **Origin** | Medial third of superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous processes and supraspinous ligaments of seventh cervical and all thoracic vertebrae |
| **Insertion** | Upper part—lateral third of clavicle<br>Middle part—acromion and crest of spine of scapula<br>Lower part—medial portion of crest of spine of scapula (tubercle) |
| **Action** | Upper part elevates scapula,* middle part retracts (adducts) scapula, lower part depresses scapula, upper and lower parts together rotate scapula (important in elevating arm) |
| **Nerve** | Accessory (eleventh cranial), C3, C4 |
| **Relationships** | Most superficial muscle of back |

*Upper part stabilizes scapula against downward rotation, as when weight is carried in the hand.

# LATISSIMUS DORSI

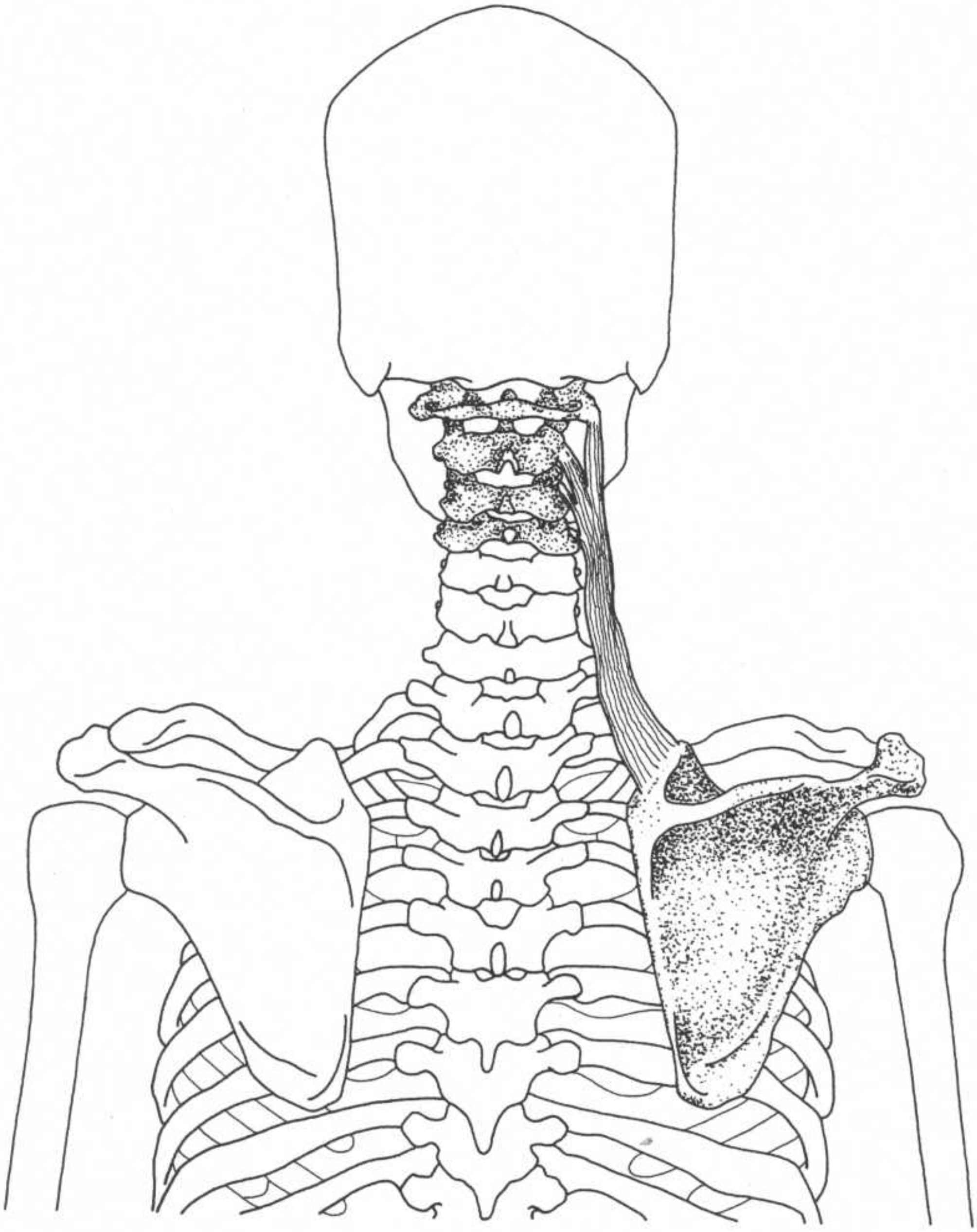


## Posterior view

| | | | |
|---|---|---|---|
| **Origin** | Spinous processes of the lower six thoracic vertebrae, lumbar vertebrae, sacral vertebrae, supraspinal ligament, and posterior part of the iliac crest through the lumbar (thoracolumbar) fascia, lower three or four ribs, inferior angle of the scapula | **Action** | Extends, adducts, and medially rotates the arm, draws the shoulder downward and backward, keeps inferior angle of scapula against the chest wall, accessory muscle of respiration |
| **Insertion** | Floor (bottom) of the bicipital groove of humerus | **Nerve** | Thoracodorsal nerve (C6–C8) |

Note: This muscle is used for the crawl stroke in swimming.

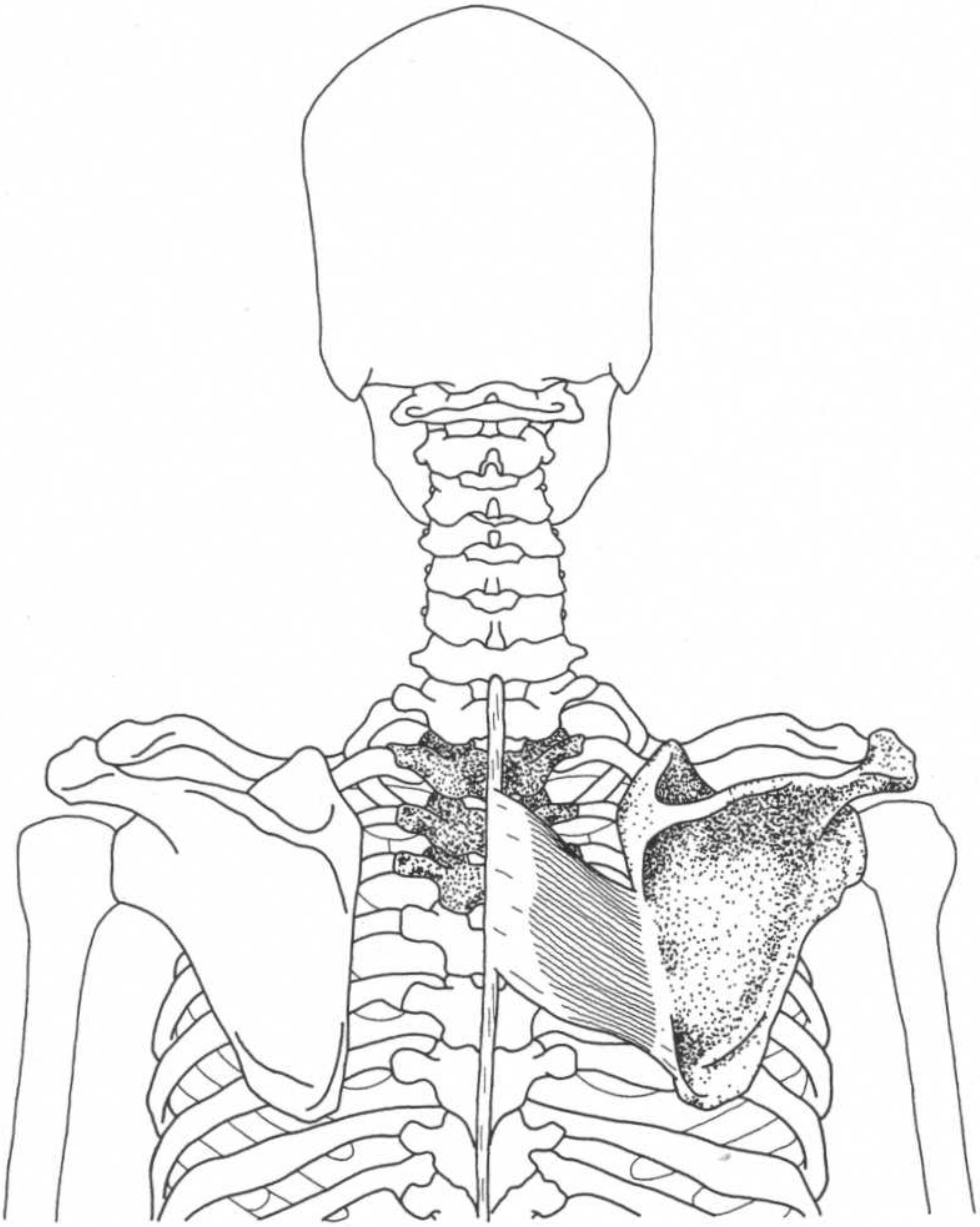
# LEVATOR SCAPULAE



**Posterior view**

| | |
|---|---|
| **Origin** | Posterior tubercles of the transverse processes of the first four cervical vertebrae |
| **Insertion** | Vertebral (medial) border of the scapula at and above the spine |
| **Action** | Elevates medial border of scapula, rotates scapula to lower the lateral angle, acts with trapezius and rhomboids to pull scapula medially and upward, bends neck laterally |
| **Nerve** | Dorsal scapular nerve (C5) |

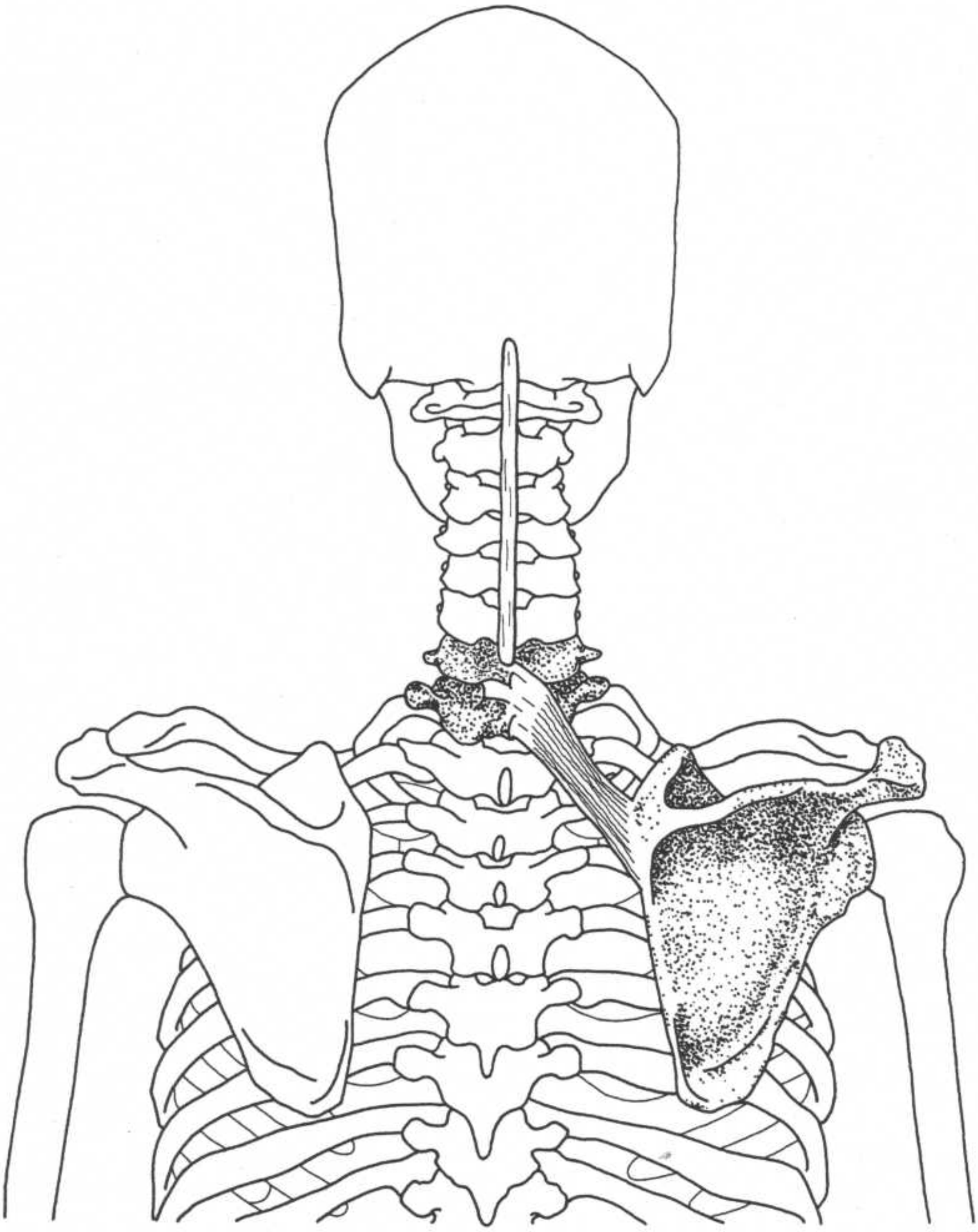
# RHOMBOIDEUS MAJOR



## Posterior view

| | | | |
|---|---|---|---|
| **Origin** | Spines of the second to fifth thoracic vertebrae, supraspinous ligament | **Action** | Retracts and stabilizes scapula, elevates the medial border of the scapula causing downward rotation, assists in adduction of arm |
| **Insertion** | Medial border of the scapula below the spine | **Nerve** | Dorsal scapular nerve (C5) |

# RHOMBOIDEUS MINOR

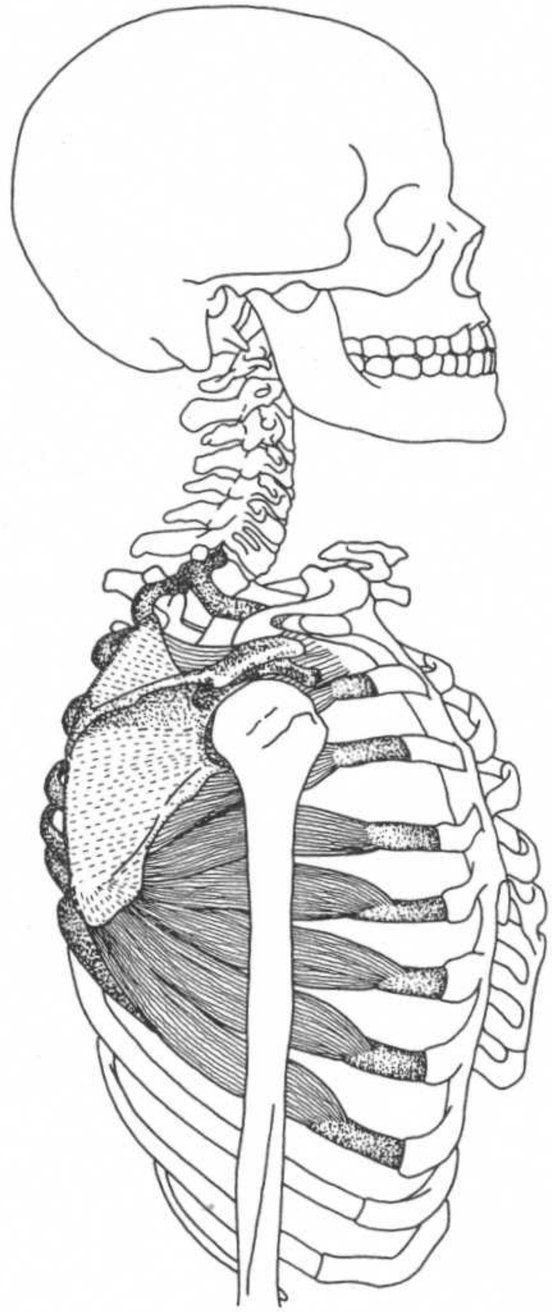


Posterior view

| | | | |
|---|---|---|---|
| **Origin** | Spines of the seventh cervical and first thoracic vertebrae, lower part of the ligamentum nuchae | **Action** | Retracts and stabilizes scapula, elevates the medial border of the scapula, rotates the scapula to depress the lateral angle (assists in adduction of arm) |
| **Insertion** | Medial border of the scapula at the root of the spine | **Nerve** | Dorsal scapular nerve (C5) |

# SERRATUS ANTERIOR

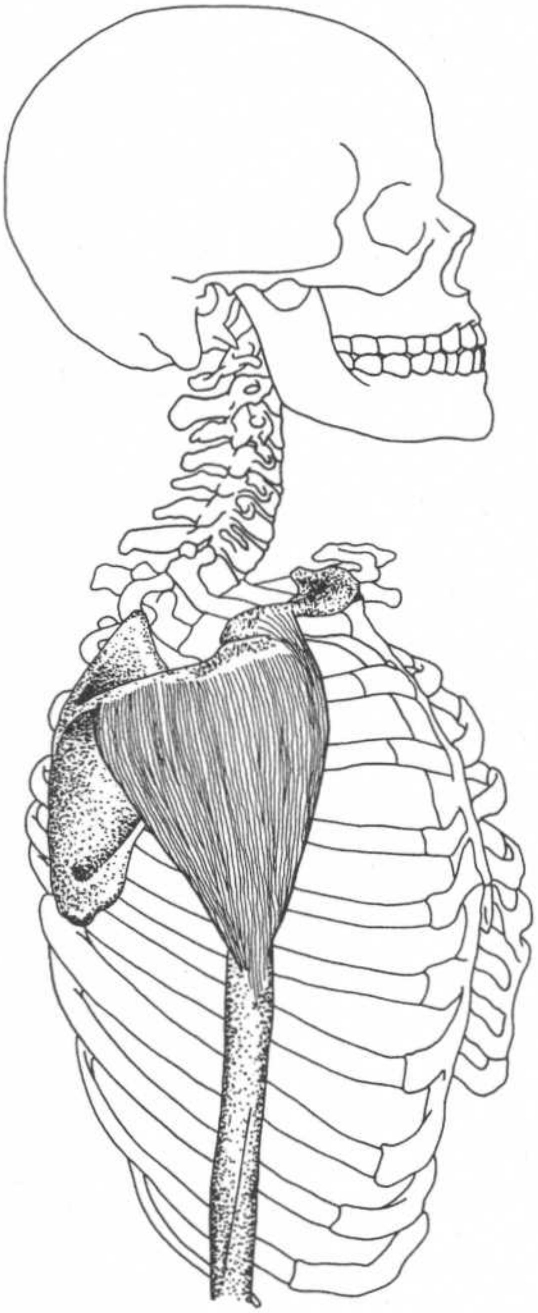
| | |
|---|---|
| **Origin** | Outer surfaces and superior borders of first eight or nine ribs, and fascia covering first intercostal space |
| **Insertion** | Anterior surface (costal surface) of the medial border of the scapula |
| **Action** | Rotates scapula for abduction and flexion of arm, protracts scapula |
| **Nerve** | Long thoracic nerve (C5–C7) |
| **Relationships** | Serratus anterior and rhomboids both insert on the medial border of scapula; they are antagonists causing protraction and retraction |



**Lateral view**

# DELTOIDEUS

| | |
|---|---|
| **Origin** | Anterior portion—anterior border and superior surface of the lateral third of the clavicle<br>Middle portion—lateral border of the acromion process<br>Posterior portion—lower border of the crest of the spine of the scapula |
| **Insertion** | Deltoid tuberosity, on the middle of the lateral surface of the shaft of the humerus |
| **Action** | Anterior portion—flexes and medially rotates arm<br>Middle portion—abducts arm<br>Posterior portion—extends and laterally rotates arm |
| **Nerve** | Axillary nerve (C5, C6) |



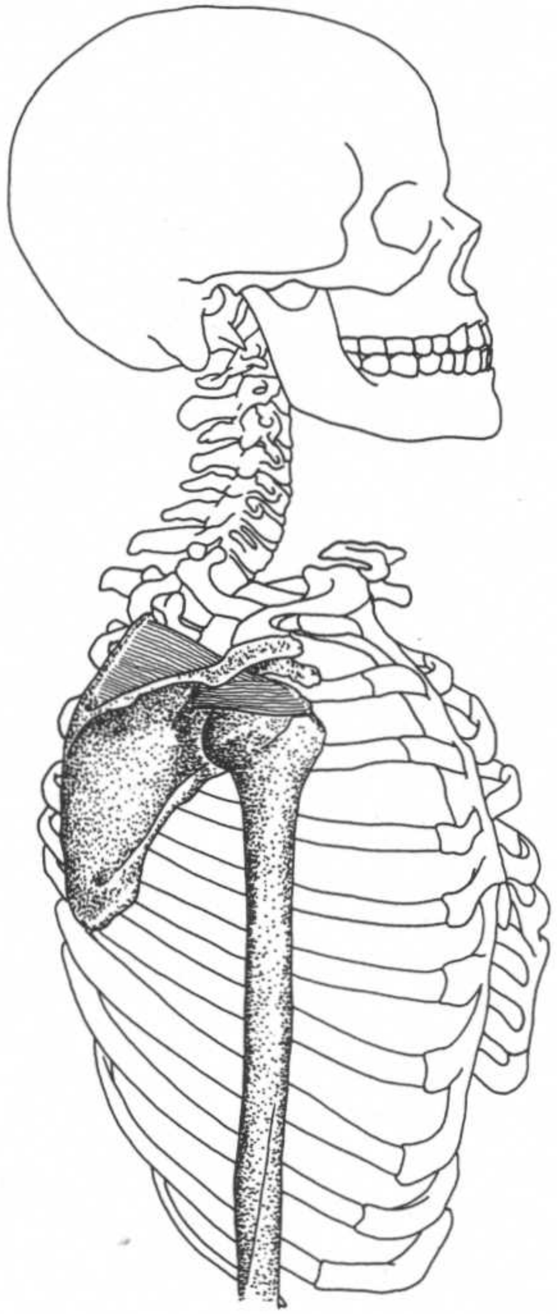
**Lateral view**

# SUPRASPINATUS

*(Rotator cuff*)*

| | |
|---|---|
| **Origin** | Supraspinous fossa of scapula |
| **Insertion** | Upper part of the greater tuberosity of the humerus, capsule of the shoulder joint |
| **Action** | Aids deltoid in abduction of arm, draws humerus toward glenoid fossa preventing deltoid from forcing humerus up against acromion, weakly flexes arm |
| **Nerve** | Suprascapular nerve (C5) |

*Supraspinatus, infraspinatus, teres minor, and subscapularis together are called the rotator cuff. They prevent the larger muscles from dislocating the humerus during their actions.

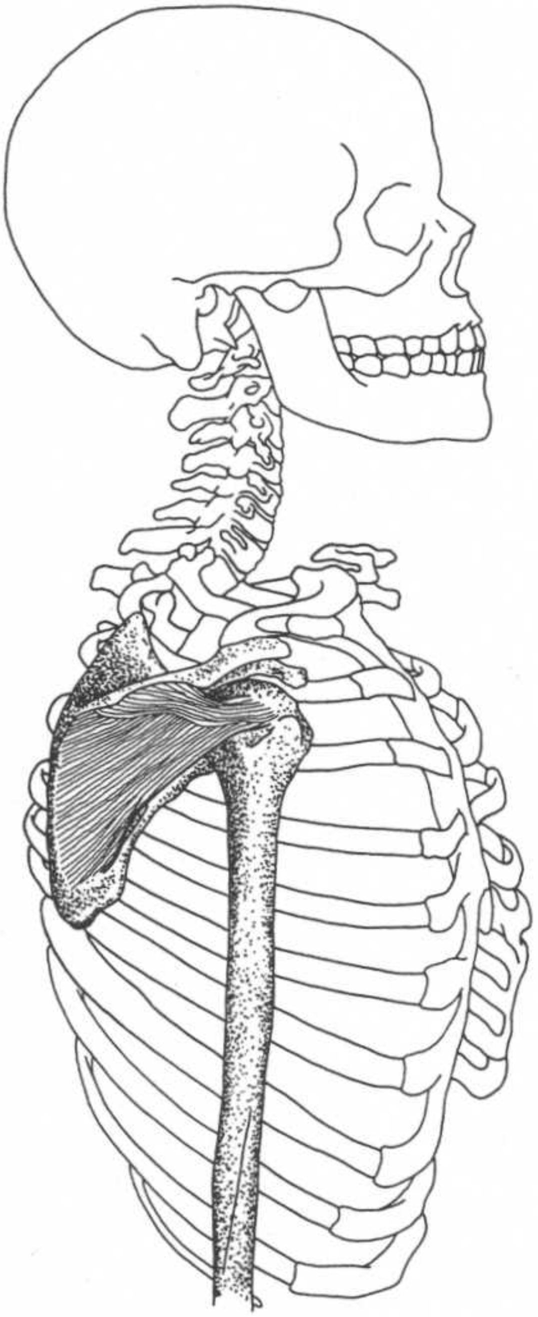


**Lateral view**

# INFRASPINATUS

*(Rotator cuff)*

| | |
|---|---|
| **Origin** | Infraspinous fossa of the scapula |
| **Insertion** | Middle facet of the greater tuberosity of the humerus, capsule of the shoulder joint |
| **Action** | Draws humerus toward glenoid fossa thus resisting posterior dislocation of arm, as in crawling; laterally rotates; abducts arm |
| **Nerve** | Suprascapular nerve (C5, C6) |

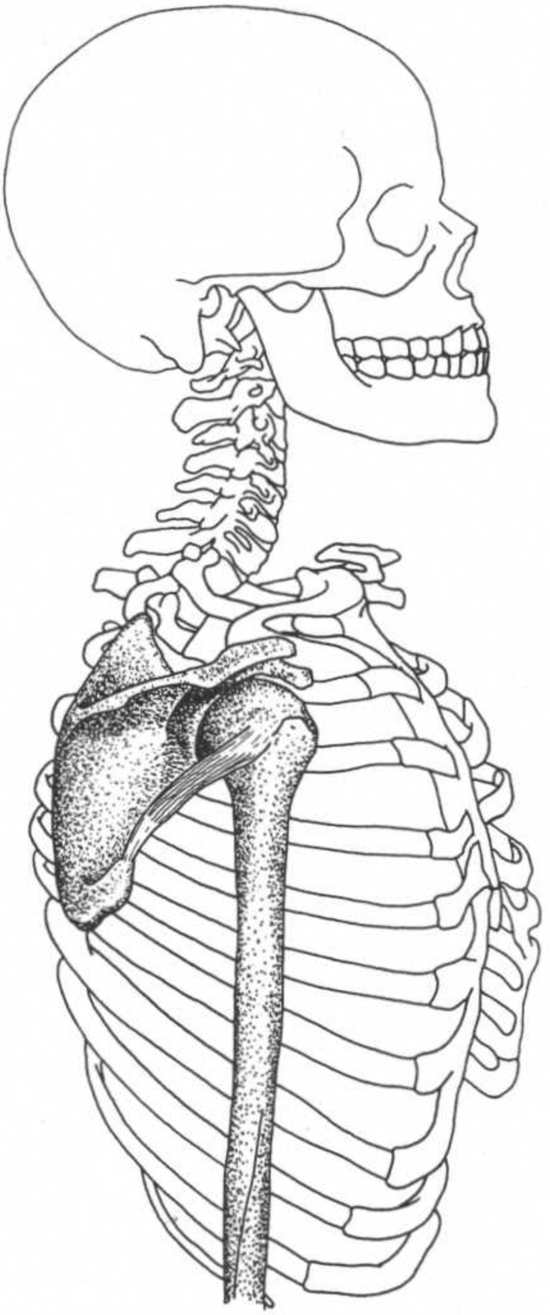


**Lateral view**

## TERES MINOR

*(Rotator cuff)*

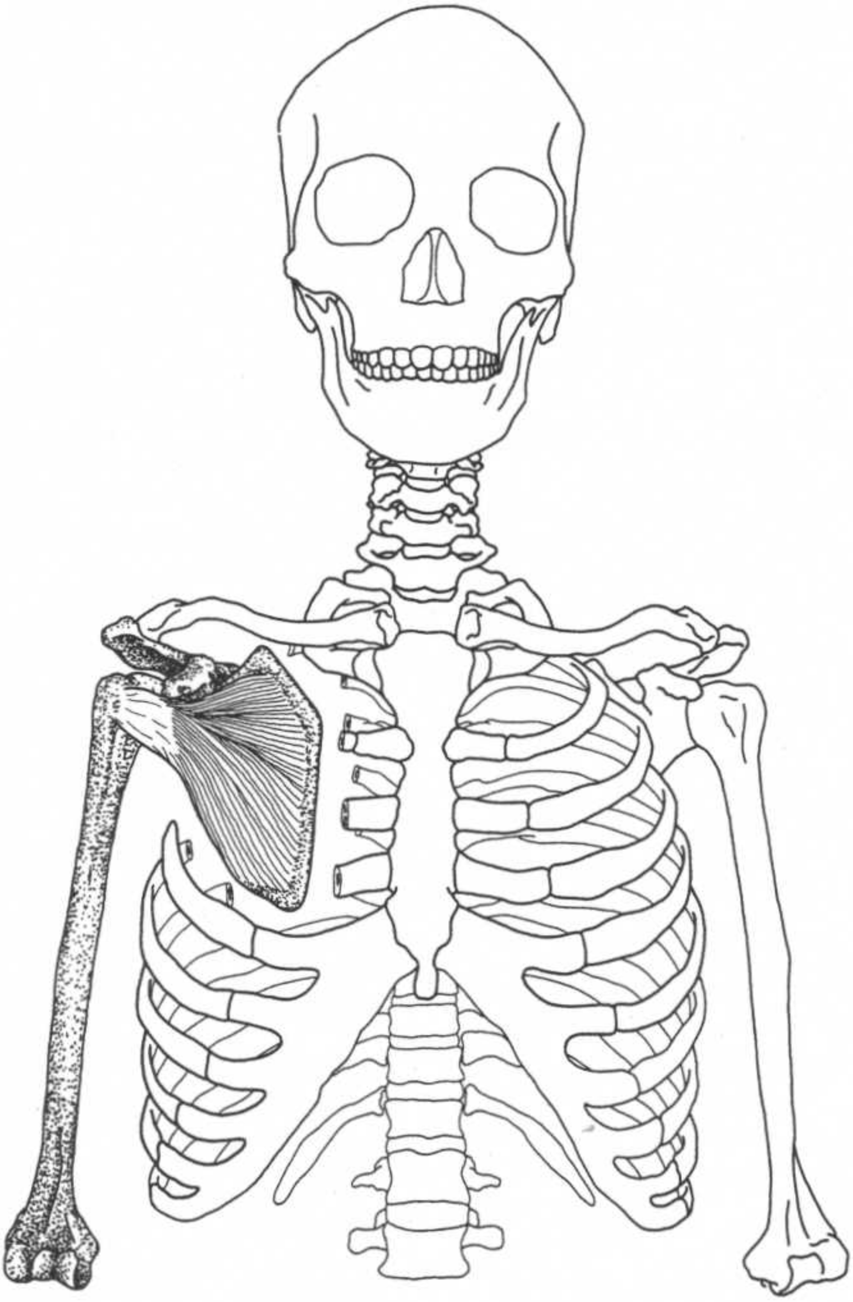
| | |
|---|---|
| **Origin** | Upper two-thirds of the dorsal surface of the axillary border of the scapula |
| **Insertion** | The capsule of the shoulder joint, the lower facet of the greater tuberosity of the humerus |
| **Action** | Laterally rotates arm, weakly adducts arm, draws humerus toward glenoid fossa |
| **Nerve** | Axillary nerve (C5) |



**Lateral view**

# SUBSCAPULARIS

*(Rotator cuff)*

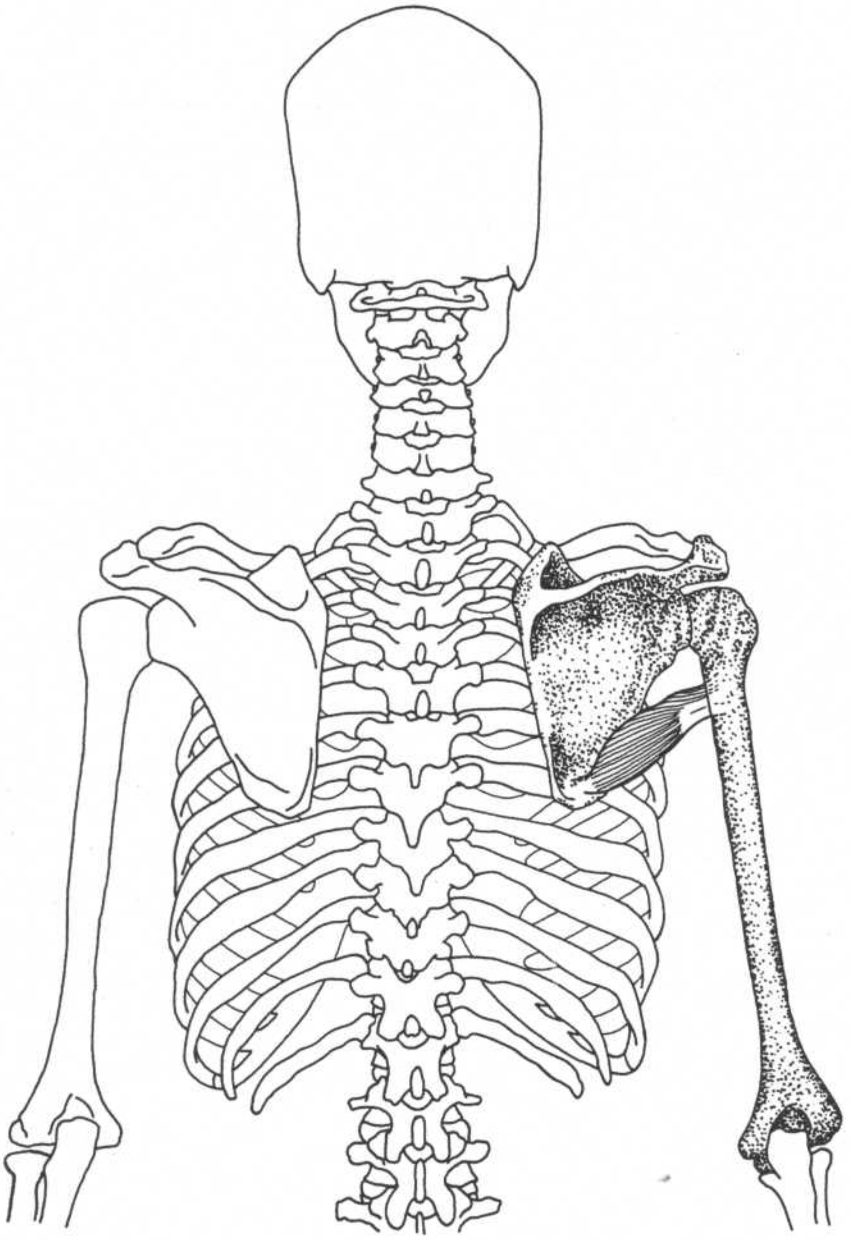


## Anterior view

*(Upper ribs cut away)*

| | | | |
|---|---|---|---|
| **Origin** | Subscapular fossa on the anterior surface of scapula | **Action** | Medially rotates arm, stabilizes glenohumeral joint |
| **Insertion** | Lesser tuberosity of the humerus, ventral part of the capsule of the shoulder joint | **Nerve** | Upper and lower subscapular nerves (C5, C6) |

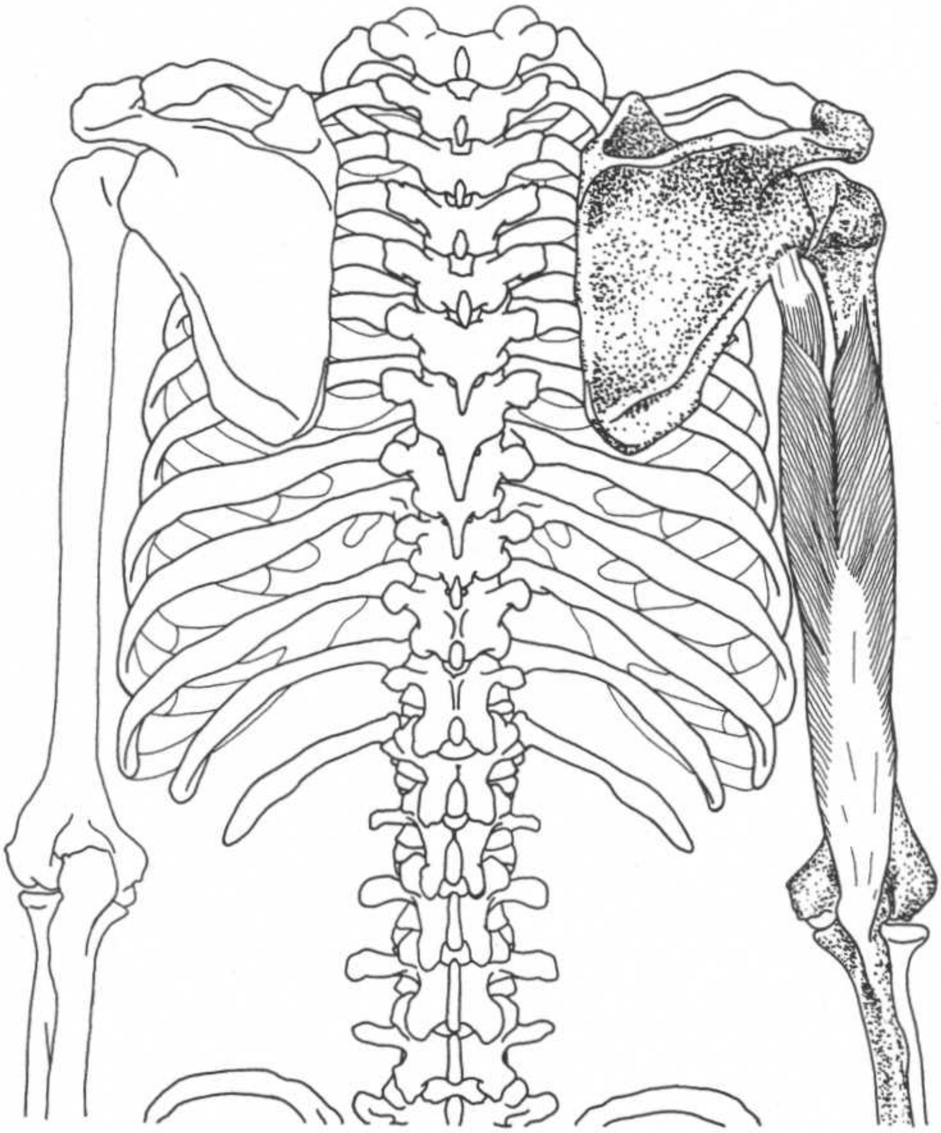
# TERES MAJOR



**Posterior view**

| | |
|---|---|
| **Origin** | Lower third of the posterior surface of the lateral border of the scapula, near the inferior angle |
| **Insertion** | Medial lip of the bicipital groove of the humerus |
| **Action** | Medially rotates arm, adducts arm, extends arm |
| **Nerve** | Lower subscapular nerve (C5, C6) |

# TRICEPS BRACHII

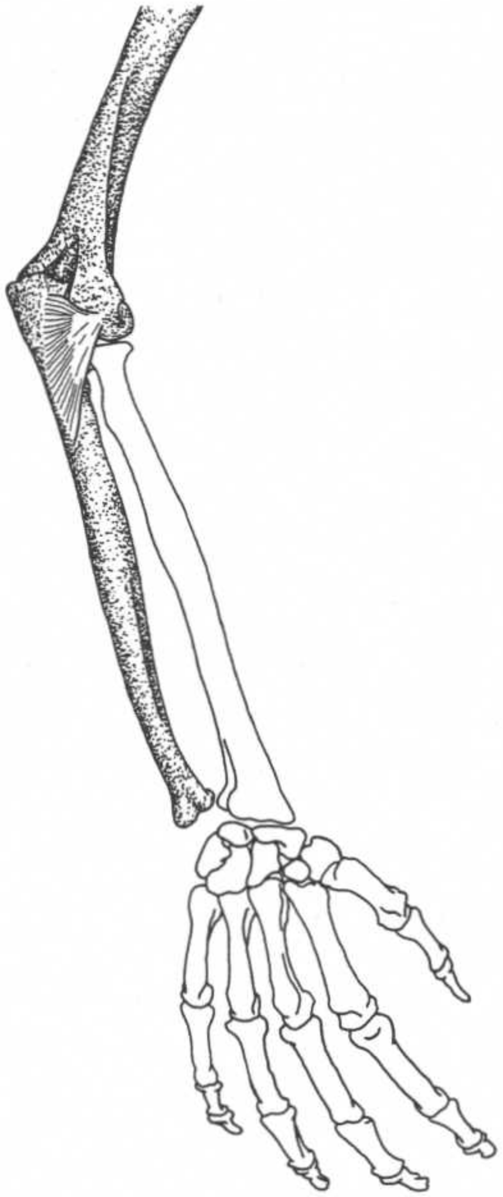


**Posterior view**

| | |
|---|---|
| **Origin** | Long head—infraglenoid tubercle of the scapula<br>Lateral head—upper half of the posterior surface of the shaft of the humerus<br>Medial head—posterior surface of the lower half of the shaft of the humerus |
| **Insertion** | Posterior part of olecranon process of the ulna |
| **Action** | Extends forearm, long head aids in adduction if arm is abducted |
| **Nerve** | Radial nerve (C7, C8) |

Note: The radial nerve comes from the axilla (armpit) and passes along the humerus between the medial and lateral heads. Because of its position, it is the most commonly injured peripheral nerve.

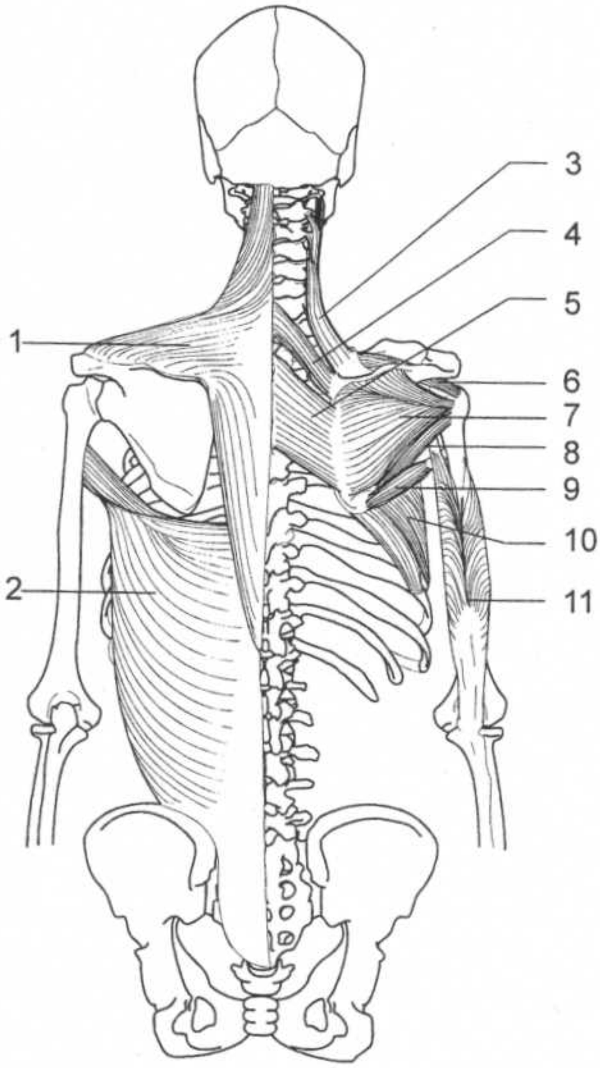
## ANCONEUS



Posterior view of arm

| | | | |
|---|---|---|---|
| **Origin** | Posterior part of lateral epicondyle of the humerus | **Action** | Extends forearm (assists triceps) |
| **Insertion** | Lateral surface of the olecranon process and posterior surface of ulna | **Nerve** | Radial nerve (C7, C8) |

# POSTERIOR BACK, SHOULDER, AND ARM MUSCLES



Trunk—dorsal view

Superficial layer

**1.** Trapezius
**2.** Latissimus dorsi

Deep layer

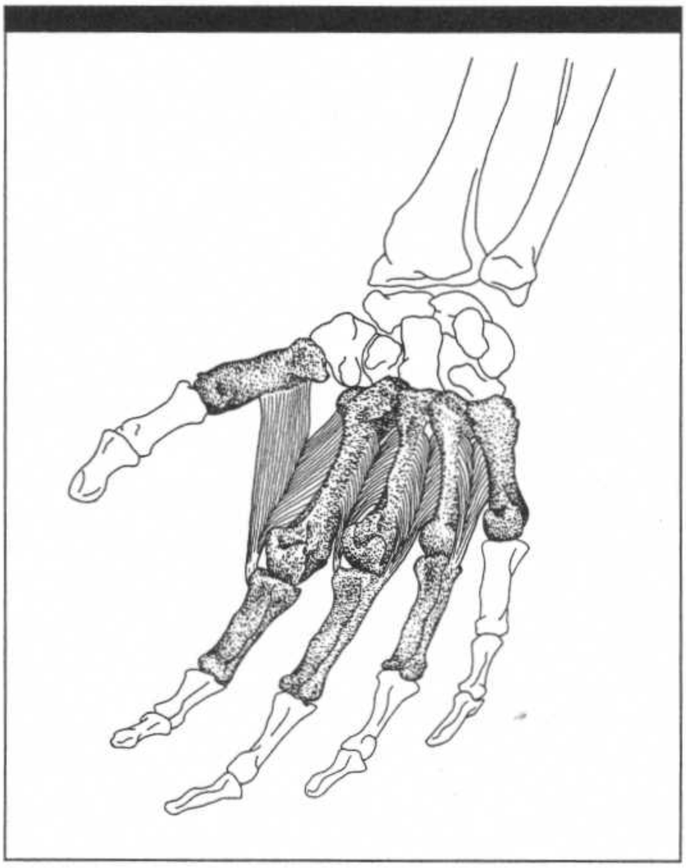
**3.** Levator scapulae
**4.** Rhomboideus minor
**5.** Rhomboideus major
**6.** Supraspinatus (rotator cuff)
**7.** Infraspinatus (rotator cuff)
**8.** Teres minor (rotator cuff)
**9.** Teres major
**10.** Serratus anterior

Posterior arm

**11.** Triceps brachii

## CHAPTER SEVEN

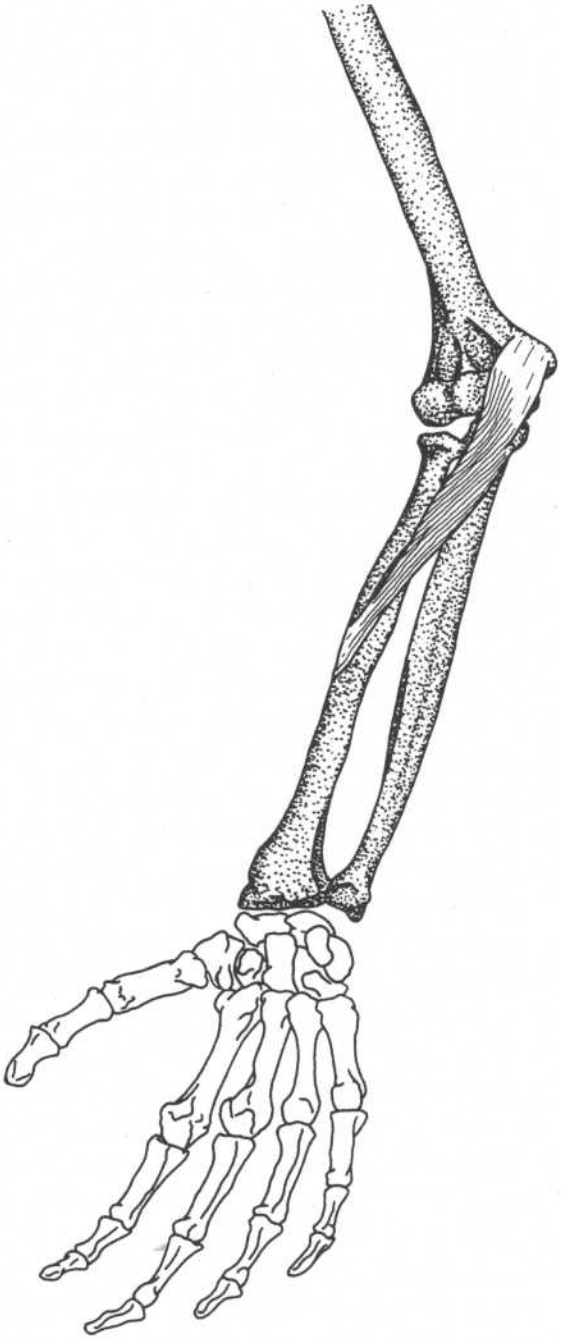
# MUSCLES OF THE FOREARM AND HAND



# PRONATOR TERES

*(Superficial group)*

| | |
|---|---|
| **Origin** | Humeral head—medial supracondylar ridge and medial epicondyle of the humerus<br>Ulnar head—medial border of the coronoid process of the ulna |
| **Insertion** | Middle of lateral surface of the radius (pronator tuberosity) |
| **Action** | Pronates and flexes forearm |
| **Nerve** | Median nerve (C6, C7) |

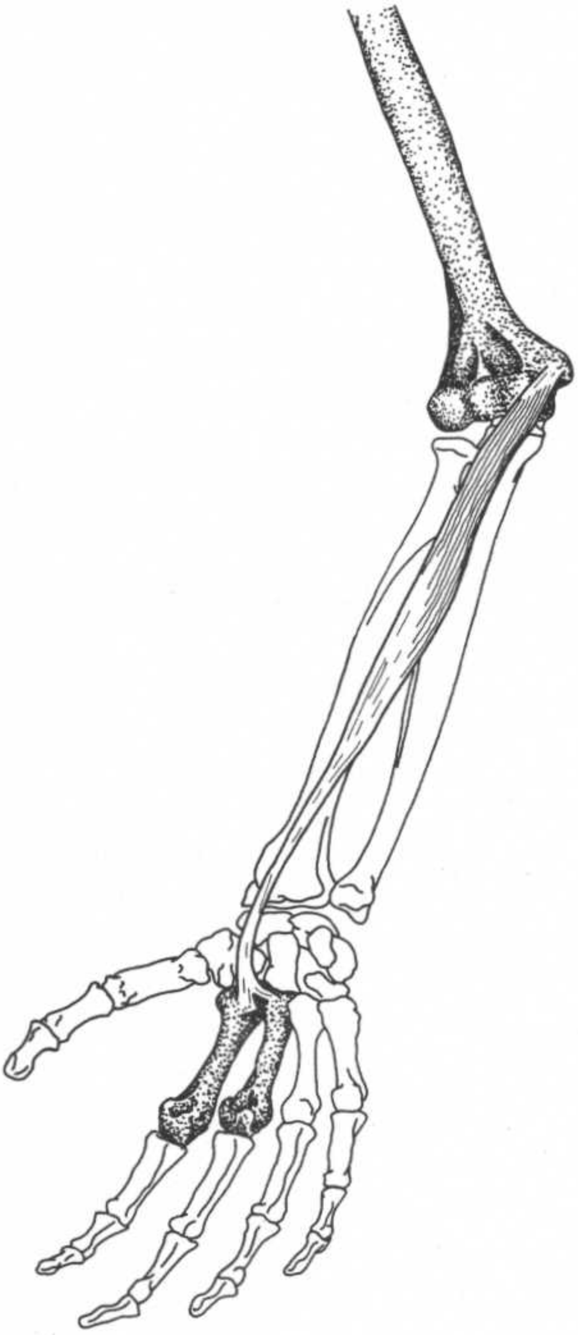


**Forearm—anterior view**

# FLEXOR CARPI RADIALIS

*(Superficial group)*

| | |
|---|---|
| **Origin** | Medial epicondyle of the humerus through the common tendon |
| **Insertion** | Front of the bases of the second and third metacarpal bones |
| **Action** | Flexes hand, synergist in abduction with extensor carpi radialis longus and brevis |
| **Nerve** | Median nerve (C6, C7) |



**Forearm—anterior view**

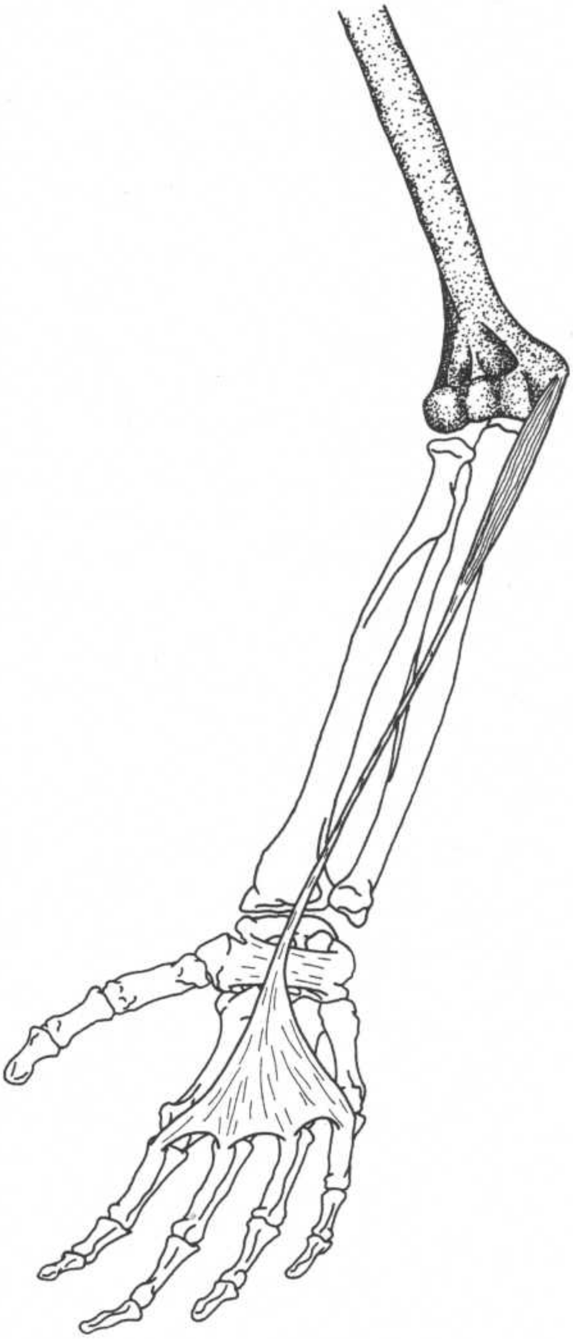
# PALMARIS LONGUS

*(Superficial group)*

| | |
|---|---|
| **Origin** | Medial epicondyle of the humerus through the common tendon |
| **Insertion** | Front (central part) of the flexor retinaculum and apex of the palmar aponeurosis |
| **Action** | Flexes the hand |
| **Nerve** | Median nerve (C6, C7) |

Note: This muscle is absent in about 14% of limbs.

Reference: Agur, Amr: *Grant's Atlas of Anatomy,* 9th ed. Williams & Wilkins, Baltimore, 1991.

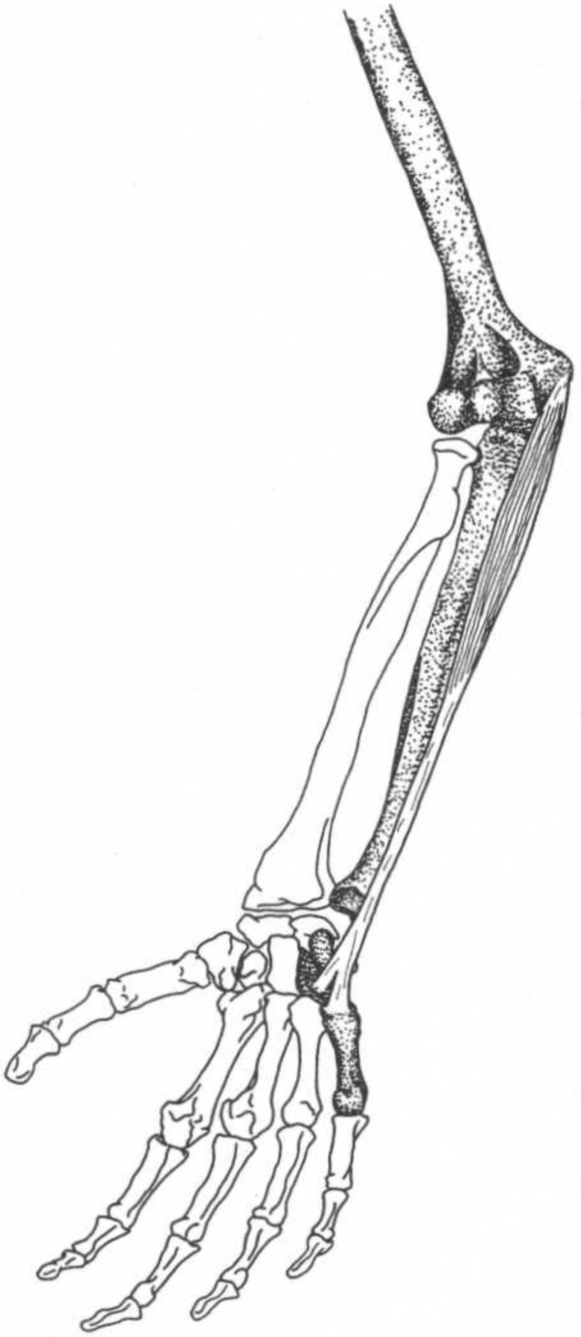


**Forearm—anterior view**

# FLEXOR CARPI ULNARIS

*(Superficial group)*

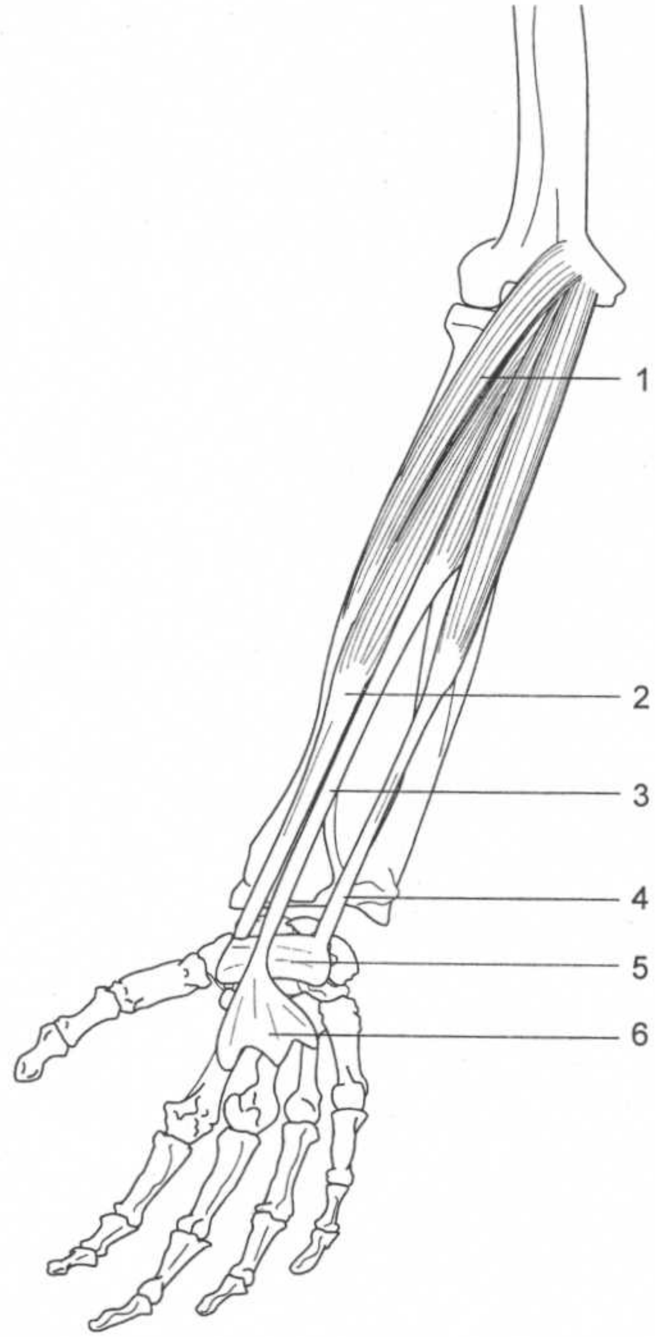
| | |
|---|---|
| **Origin** | Humeral head—medial epicondyle of the humerus through the common tendon |
| | Ulnar head—medial margin of olecranon process of ulna, dorsal border of shaft of the ulna |
| **Insertion** | Pisiform bone, hook of the hamate, and base of the fifth metacarpal bone |
| **Action** | Flexes hand, synergist in adduction of hand with extensor carpi ulnaris |
| **Nerve** | Ulnar nerve (C8, T1) |



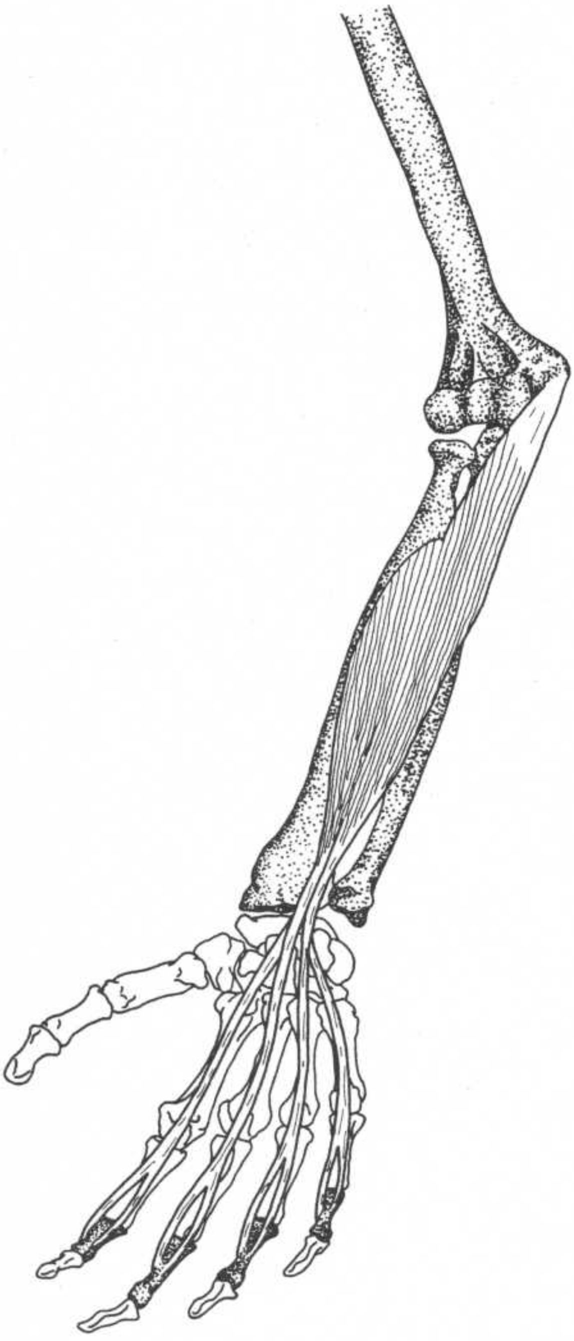
**Forearm—anterior view**

# MUSCLES OF THE WRIST

1. Pronator teres
2. Flexor carpi radialis
3. Palmaris longus
4. Flexor carpi ulnaris
5. Flexor retinaculum
6. Palmar aponeurosis



**Forearm—anterior view**



Forearm—anterior view

# FLEXOR DIGITORUM SUPERFICIALIS

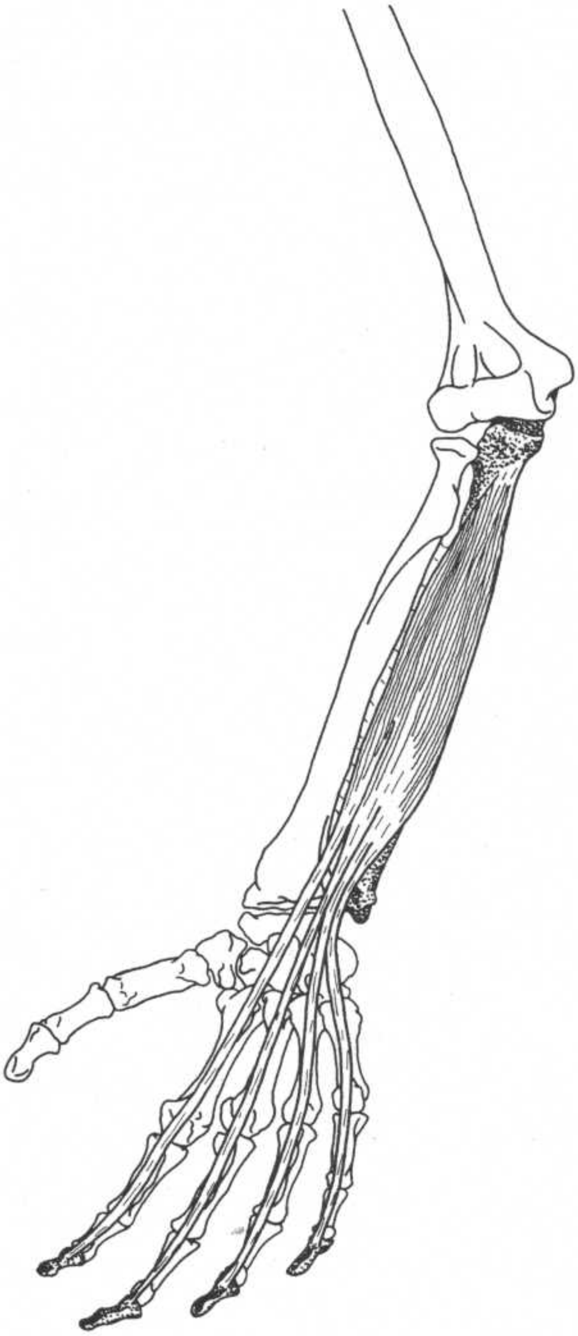
| | |
|---|---|
| **Origin** | Humeroulnar head—medial epicondyle of the humerus through common tendon,* medial margin of the coronoid process of ulna<br>Radial head—anterior surface of shaft of radius |
| **Insertion** | Four tendons divide into two slips each, slips insert into the sides (margins of the anterior surfaces) of the middle phalanges of four fingers |
| **Action** | Flexes the middle phalanges of the fingers |
| **Nerve** | Median nerve (C7, C8, T1) |
| **Relationships** | Deep to superficial flexors |

*See superficial flexors.

# FLEXOR DIGITORUM PROFUNDUS

| | |
|---|---|
| **Origin** | Upper three-fourths of anterior and medial surfaces of shaft of ulna and medial side of the coronoid process, interosseous membrane |
| **Insertion** | Front of base of distal phalanges of fingers |
| **Action** | Flexes distal phalanges |
| **Nerve** | Ulnar nerve supplies the medial half of the muscle (going to the little and ring fingers) (C8, T1)<br>Anterior interosseous branch of median nerve supplies lateral half (going to index and middle fingers) (C8, T1) |
| **Relationships** | Deep to flexor digitorum superficialis |

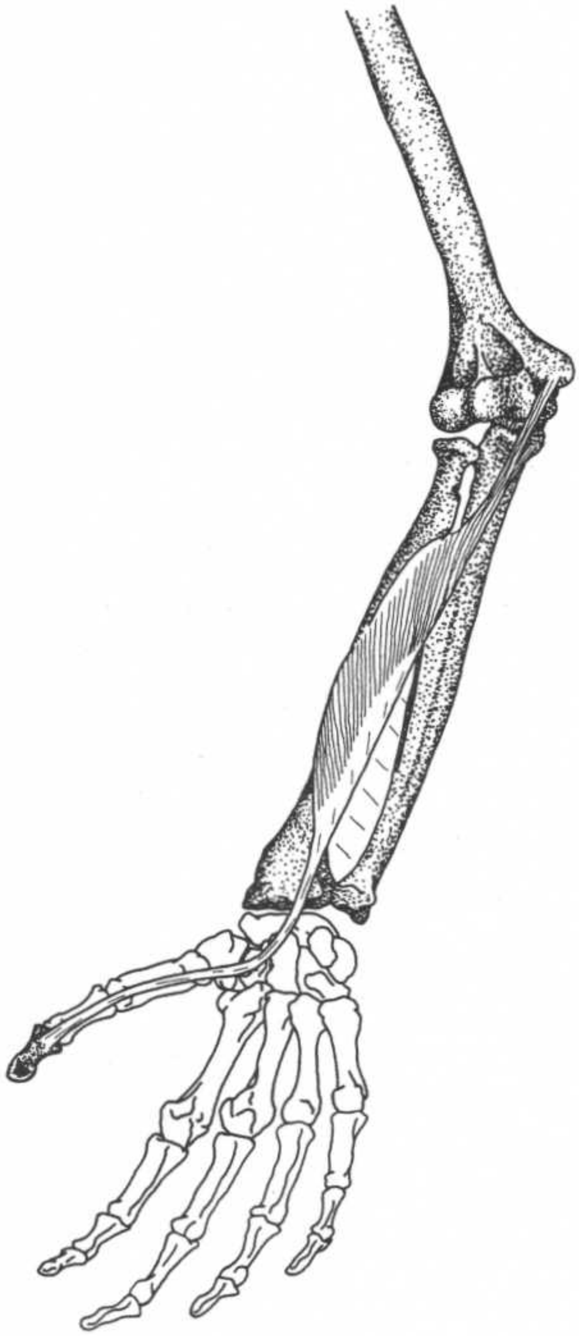
Note: Both flexor digitorum muscles and the median nerve pass under the flexor retinaculum (page 10) in the wrist. When irritated, the synovial sheaths of these muscles can compress the median nerve, causing the sensory and motor deficits known as carpal tunnel syndrome.



**Forearm—anterior view**

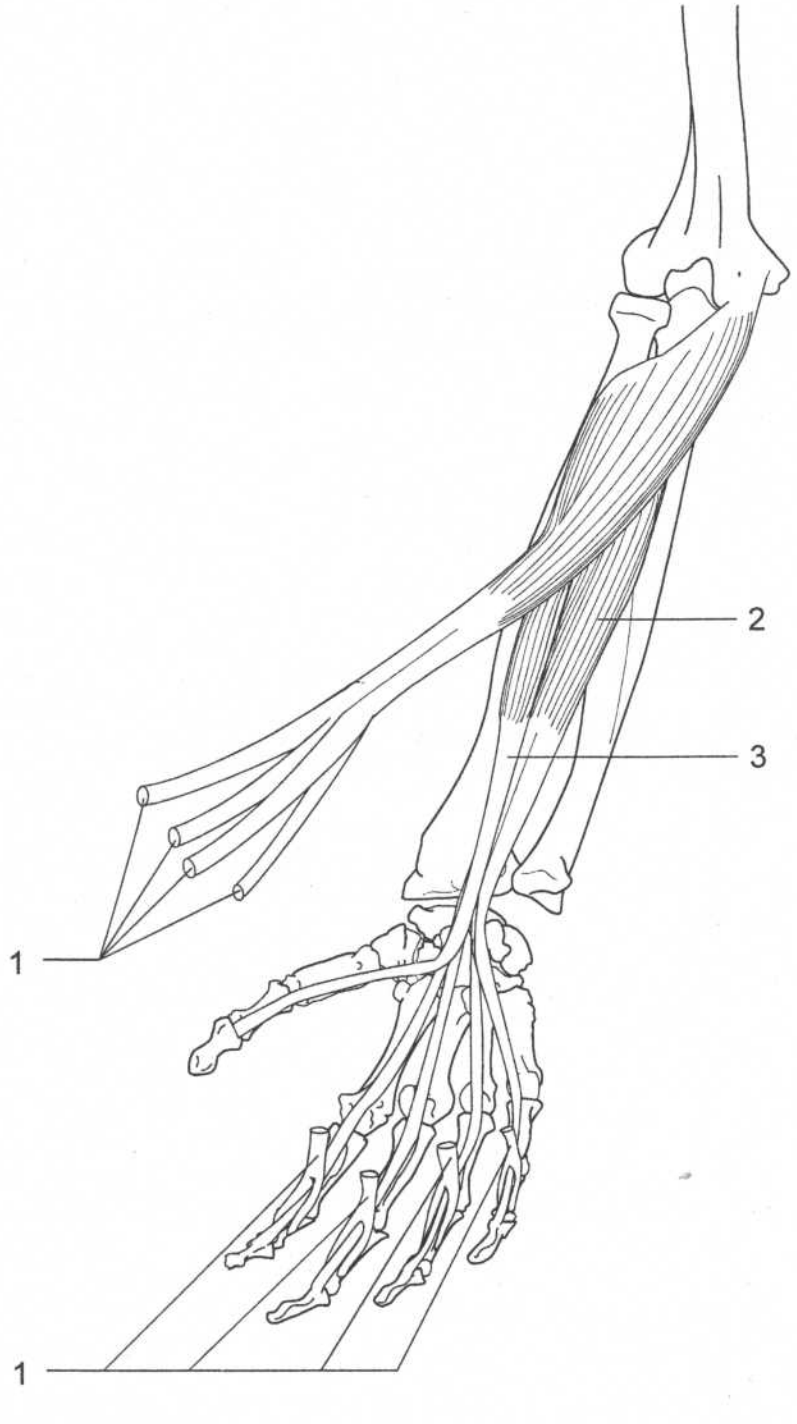
# FLEXOR POLLICIS LONGUS

| | |
|---|---|
| **Origin** | Middle of anterior surface of shaft of radius, interosseous membrane, medial epicondyle of humerus, and often coronoid process of ulna |
| **Insertion** | Palmar aspect of base of the distal phalanx of thumb |
| **Action** | Flexes the thumb |
| **Nerve** | Anterior interosseous branch of median nerve (C8, T1) |



**Forearm—anterior view**

# FLEXORS OF THE FINGERS



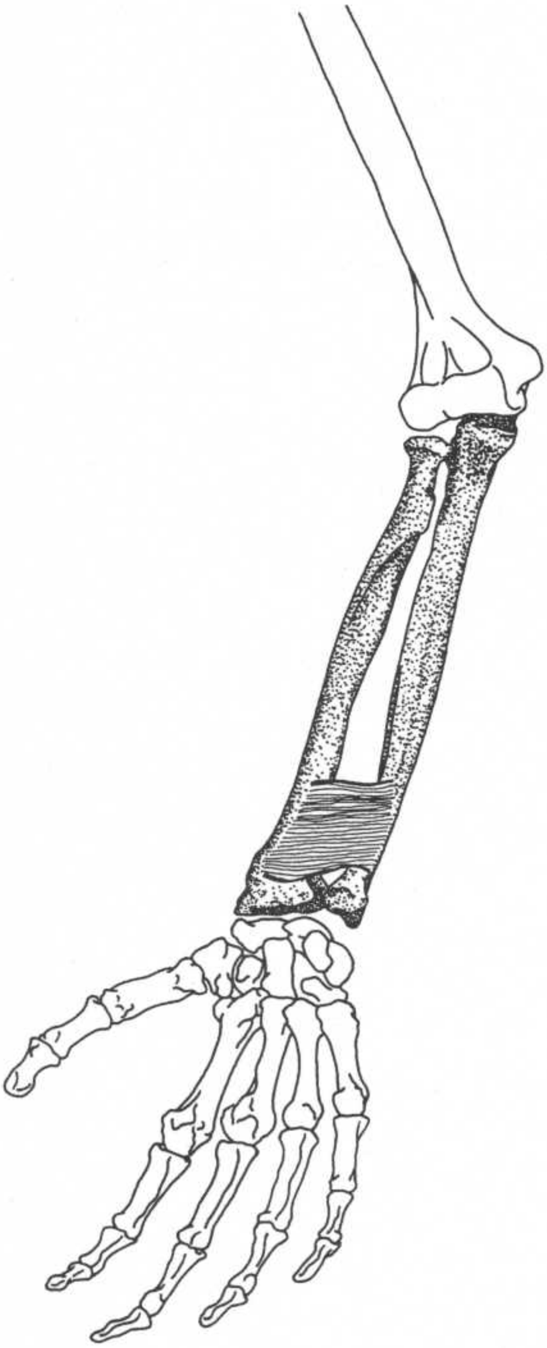
**Forearm—anterior view**

1. Flexor digitorum superficialis (cut)
2. Flexor digitorum profundus
3. Flexor pollicis longus

Note: The tendons of flexor digitorum superficialis split and attach to the middle phalanx. The tendons of flexor digitorum profundus pass through this split and continue to the distal phalanx.

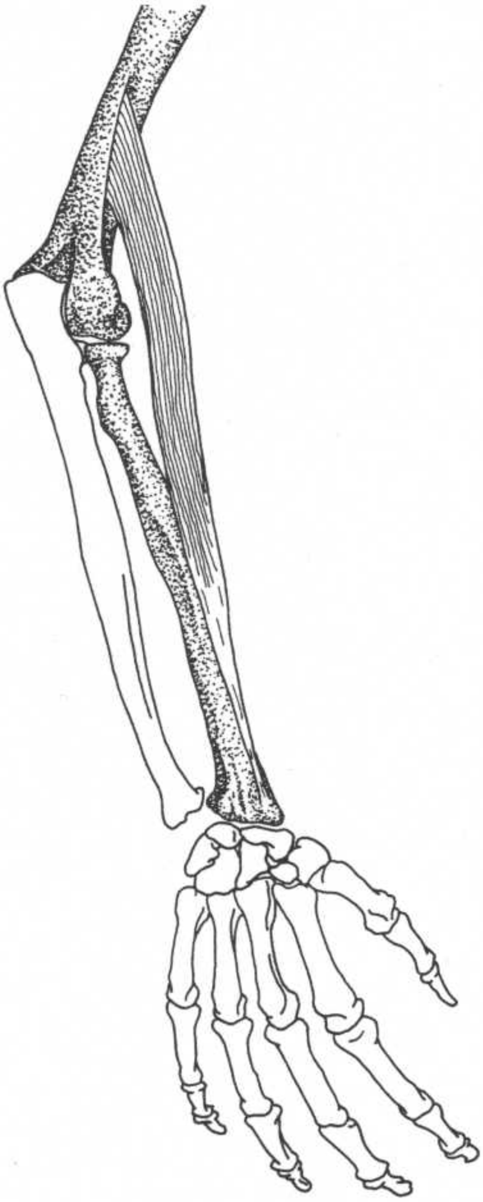
# PRONATOR QUADRATUS

| | |
|---|---|
| **Origin** | Anterior surface of distal part of shaft of ulna |
| **Insertion** | Lower portion of anterior surface of shaft of radius, distal part of lateral border of radius |
| **Action** | Pronates forearm and hand |
| **Nerve** | Anterior interosseous branch of median nerve (C8, T1) |
| **Relationships** | Deepest forearm muscle |



**Forearm—anterior view**

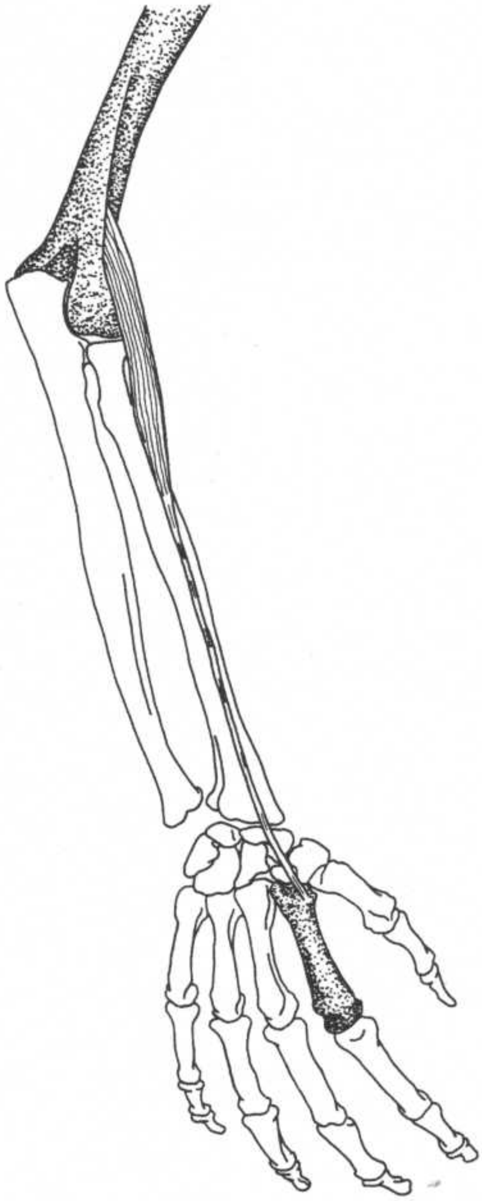
# BRACHIORADIALIS



Forearm—dorsal view

| | | | |
|---|---|---|---|
| **igin** | Upper two-thirds of lateral supracondylar ridge of humerus | **Action** | Flexes forearm |
| **sertion** | Base of styloid process and lateral surface of radius | **Nerve** | Radial nerve (C5, C6) |

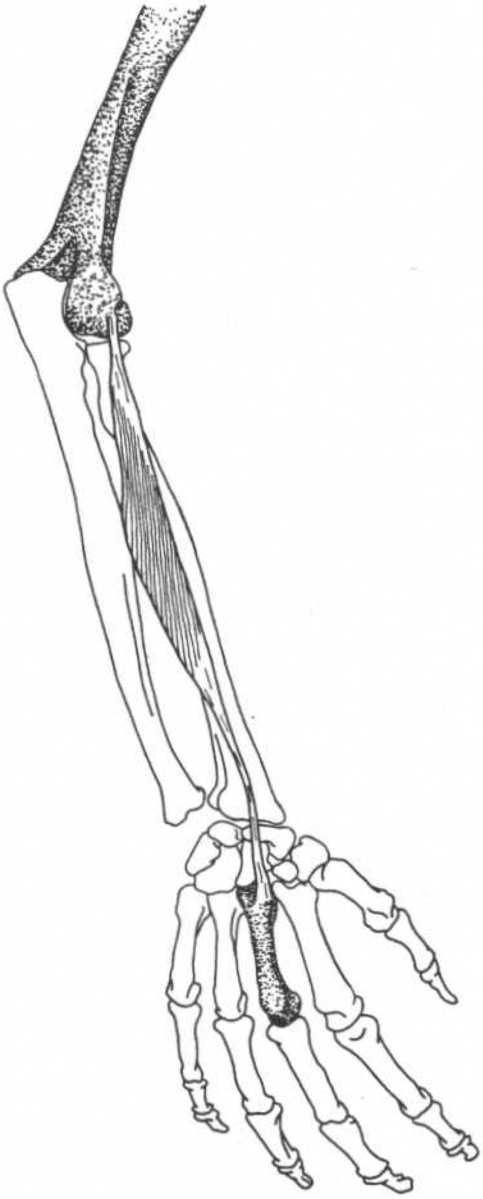
# EXTENSOR CARPI RADIALIS LONGUS



**Forearm—dorsal view**

| | |
|---|---|
| **Origin** | Lower third of lateral supracondylar ridge of humerus |
| **Insertion** | Dorsal surface of the base of the second metacarpal bone |
| **Action** | Extends hand, synergist in abduction of hand with flexor carpi radialis |
| **Nerve** | Radial nerve (C6, C7) |

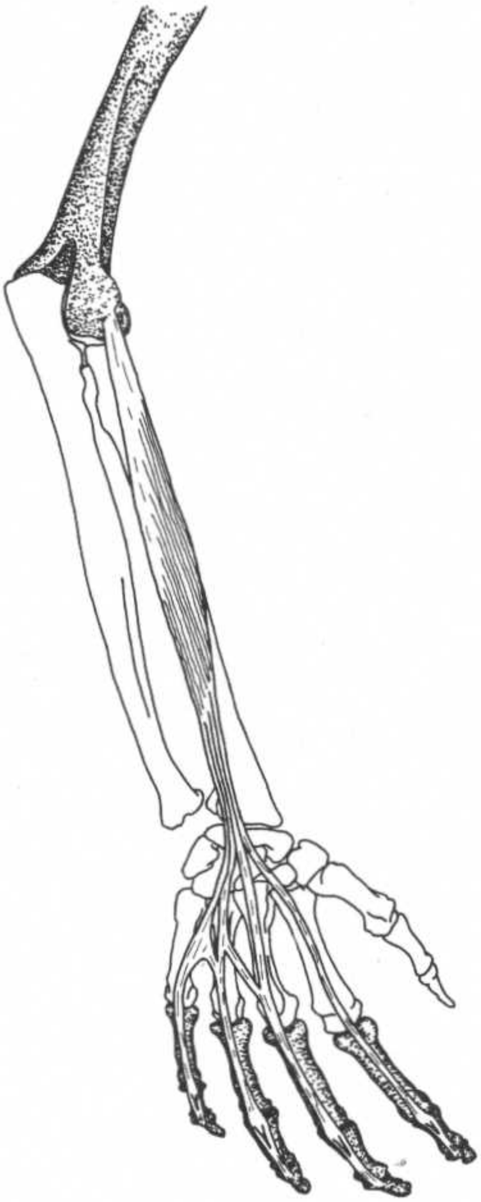
# EXTENSOR CARPI RADIALIS BREVIS



Forearm—dorsal view

| | | | |
|---|---|---|---|
| **gin** | Lateral epicondyle of humerus | **Action** | Extends hand, synergist in abduction of hand with flexor carpi radialis |
| **rtion** | Dorsal surface of third metacarpal bone | **Nerve** | Radial nerve (C6, C7) |

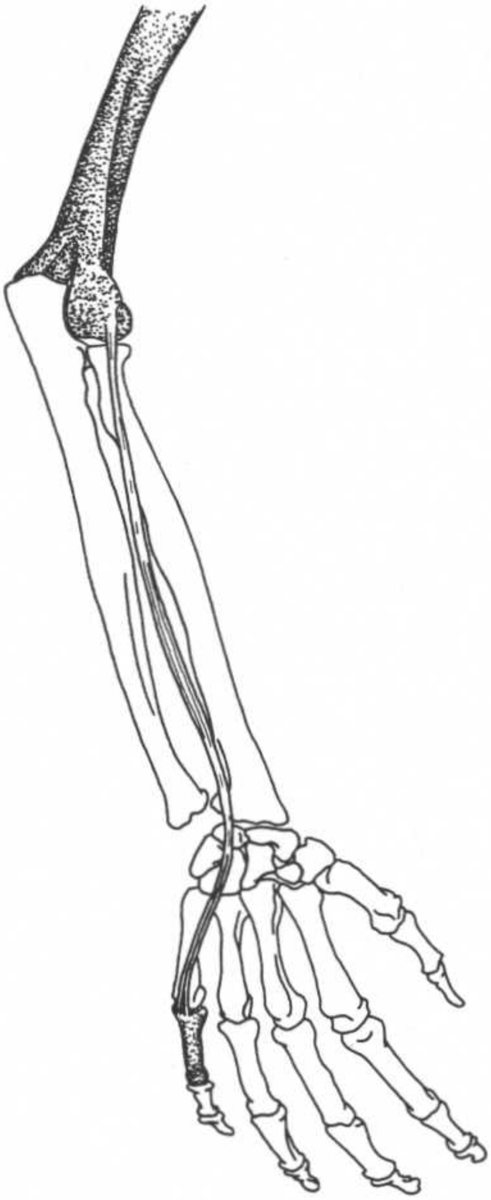
# EXTENSOR DIGITORUM COMMUNIS



**Forearm and hand—dorsal view**

| | |
|---|---|
| **Origin** | Common tendon attached to lateral epicondyle of humerus |
| **Insertion** | Lateral and dorsal surfaces of all the phalanges of the four fingers |
| **Action** | Extends the fingers and wrist |
| **Nerve** | Deep branch of radial nerve (C6–C8) |
| **Relationships** | Tends to hyperextend the metacarpophalangeal joint causing "claw hand"; its action is balanced by the lumbricales and interossei |

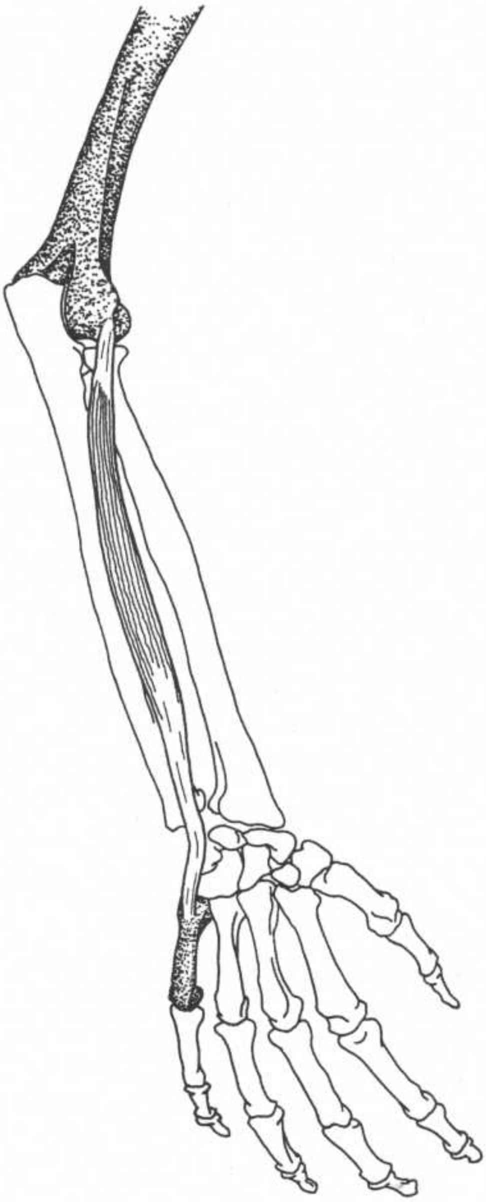
# EXTENSOR DIGITI MINIMI



Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **gin** | Common tendon attached to lateral epicondyle of humerus | **Action**<br>**Nerve** | Extends fifth finger<br>Radial nerve (C6–C8) |
| **ertion** | Dorsal surface of base of first phalanx of fifth finger | | |

# EXTENSOR CARPI ULNARIS

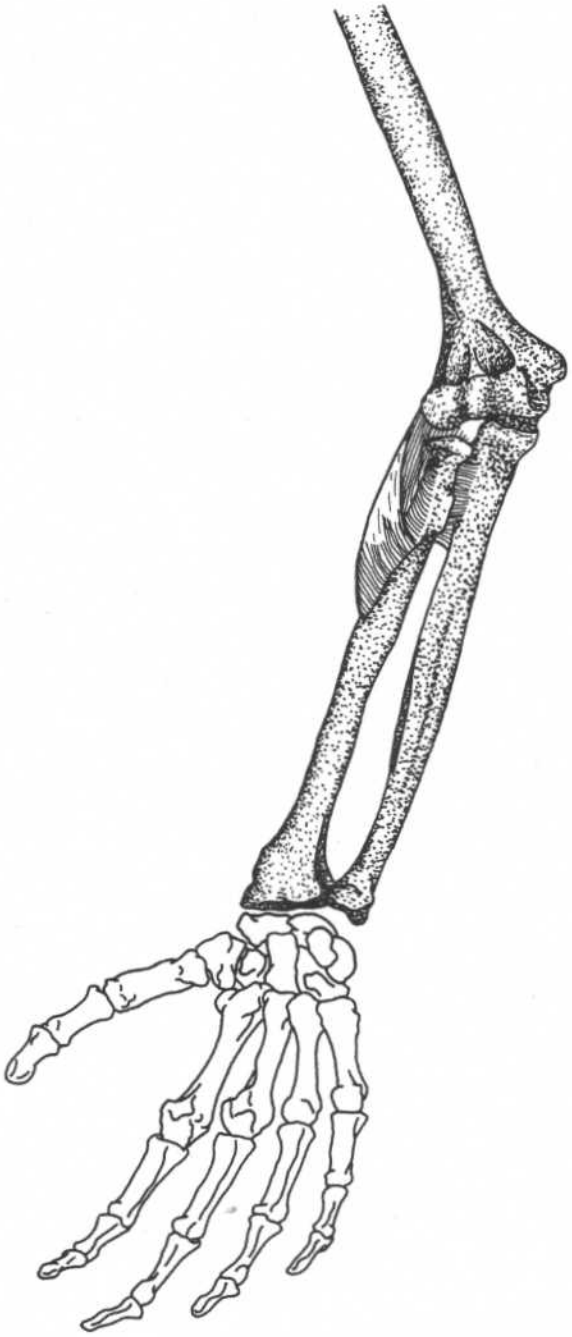


## Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Common tendon attached to lateral epicondyle of humerus | **Action** | Extends hand, synergist in adduction of hand with flexor carpi ulnaris |
| **Insertion** | Dorsal surface of base of fifth metacarpal bone | **Nerve** | Radial nerve (C6–C8) |

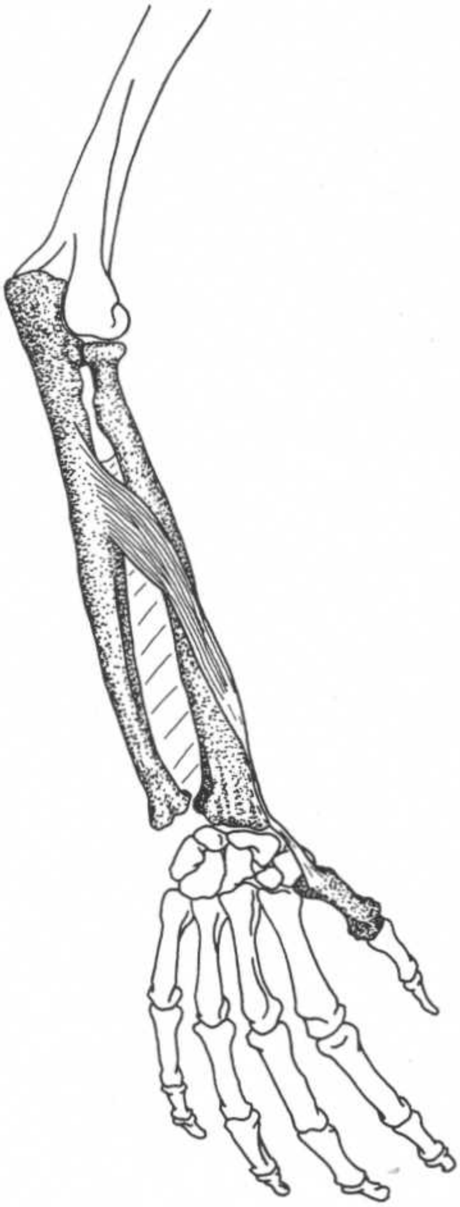
# SUPINATOR

| | |
|---|---|
| **rigin** | Lateral epicondyle of humerus, lateral ligament (radial collateral) of elbow, annular ligament of superior radioulnar joint, supinator crest of ulna |
| **nsertion** | Dorsal and lateral surfaces of upper third of radius |
| **ction** | Supinates forearm |
| **erve** | Radial nerve (C6) |



**Forearm and hand—anterior view**

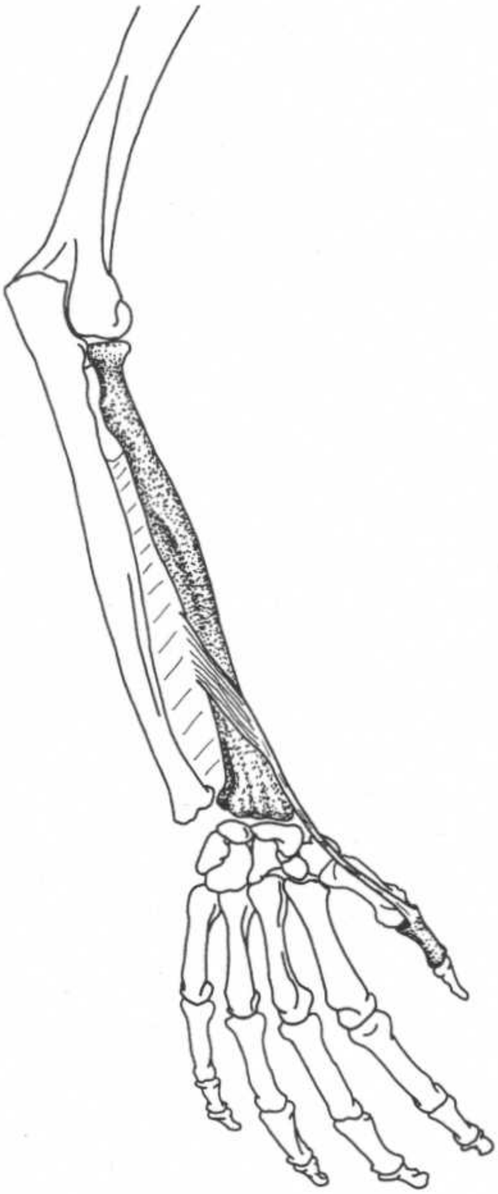
# ABDUCTOR POLLICIS LONGUS



Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Posterior (dorsal) surface of shaft of radius, ulna, interosseous membrane | **Action** | Abducts, laterally rotates, and extends thumb; abducts wrist |
| **Insertion** | Dorsal surface of base of first metacarpal bone | **Nerve** | Radial nerve (C6, C7) |

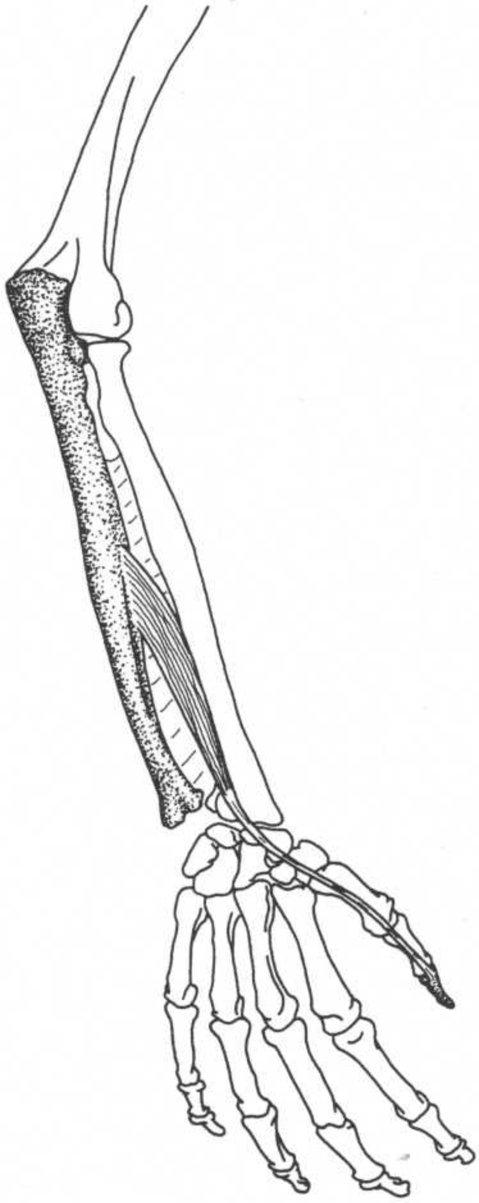
# EXTENSOR POLLICIS BREVIS



Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **in** | Dorsal surface of radius, adjacent part of interosseous membrane | **Action** | Extends thumb, abducts hand |
| **rtion** | Base of proximal phalanx of thumb | **Nerve** | Radial nerve (C6, C7) |

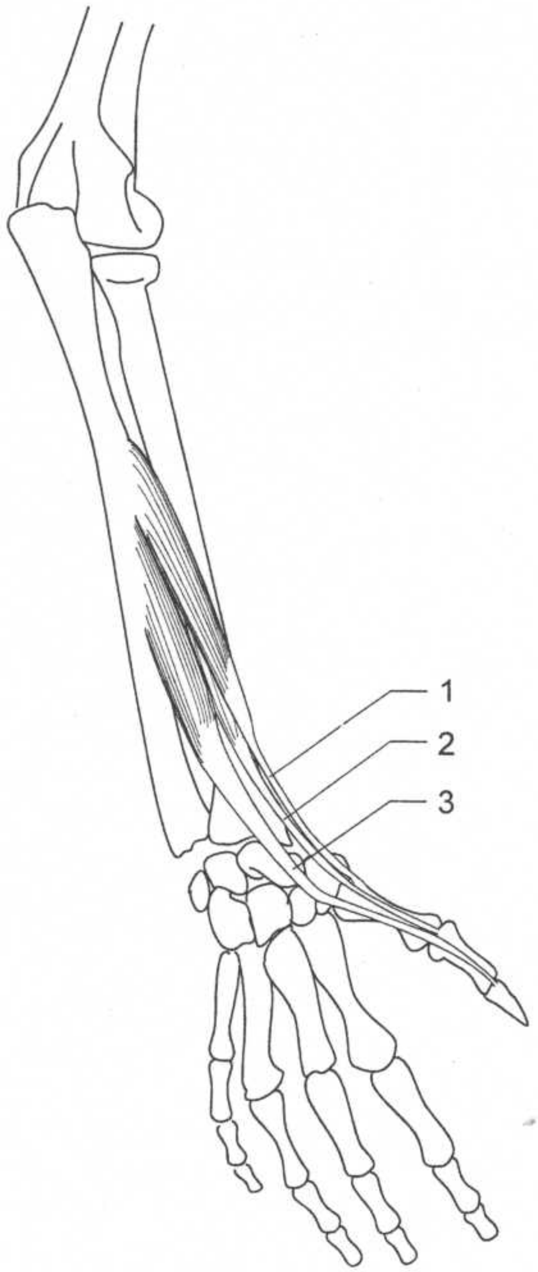
# EXTENSOR POLLICIS LONGUS



Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Middle third of dorsal surface of ulna, interosseous membrane | **Action** | Extends thumb |
| **Insertion** | Base of distal phalanx of thumb | **Nerve** | Radial nerve (C6–C8) |

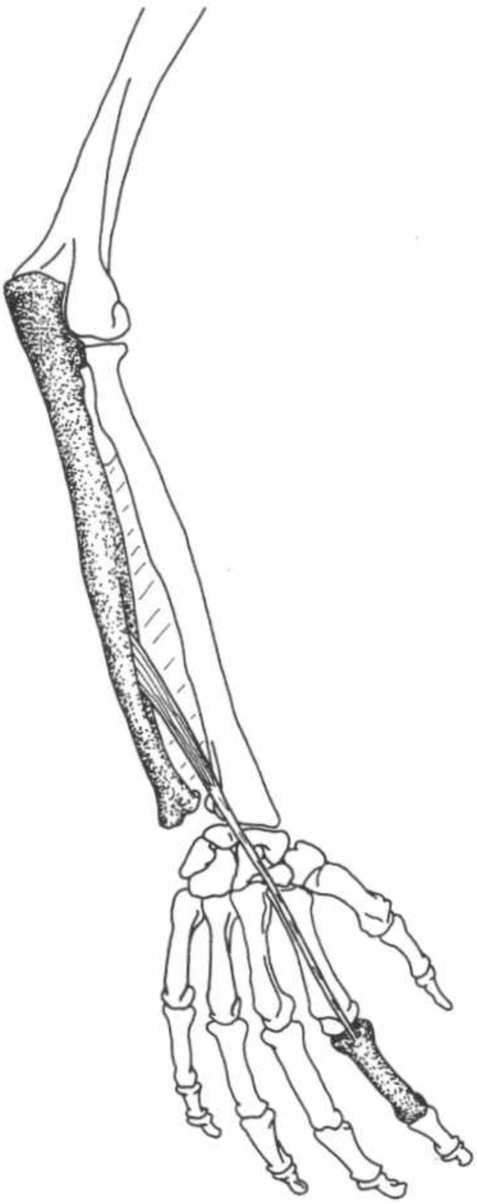
# EXTENSORS OF THE THUMB



Forearm—posterior view

1. Abductor pollicis longus
2. Extensor pollicis brevis
3. Extensor pollicis longus

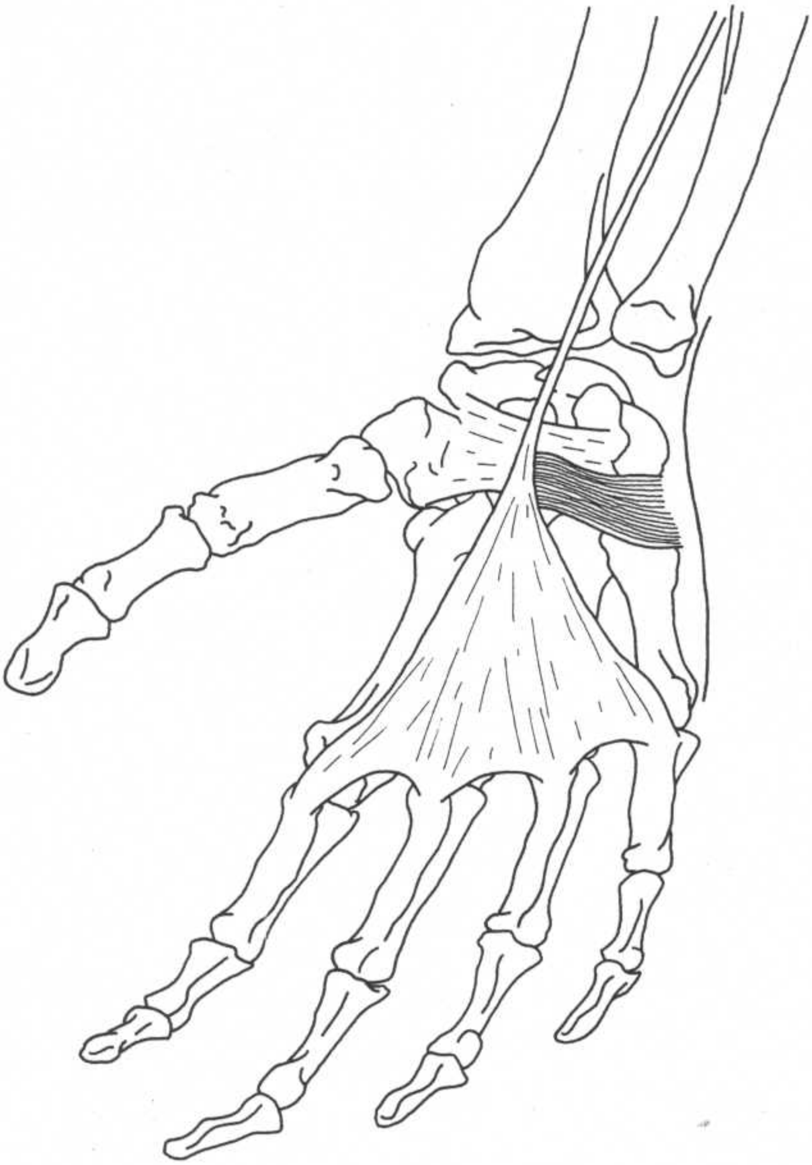
# EXTENSOR INDICIS



Forearm and hand—dorsal view

| | | | |
|---|---|---|---|
| **Origin** | Posterior surface of ulna and adjacent part of interosseous membrane | **Action** | Extends index finger |
| **Insertion** | Extensor expansion on dorsal surface of proximal phalanx of index finger | **Nerve** | Radial nerve (C6–C8) |

# PALMARIS BREVIS

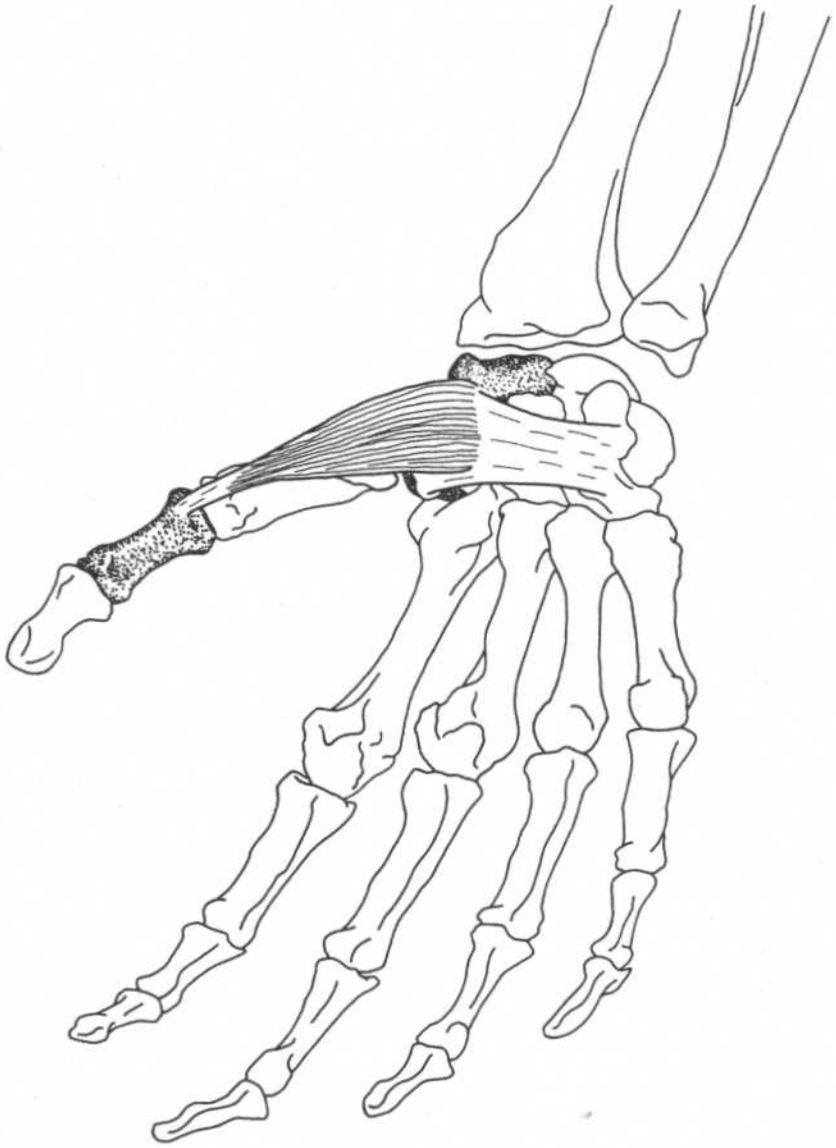


**Hand—palmar view**

| | | | |
|---|---|---|---|
| **rigin** | Flexor retinaculum, palmar aponeurosis | **Action** | Corrugates skin of palm |
| **sertion** | Skin of the palm | **Nerve** | Ulnar nerve (C8) |

# ABDUCTOR POLLICIS BREVIS

*(Thenar eminence)*



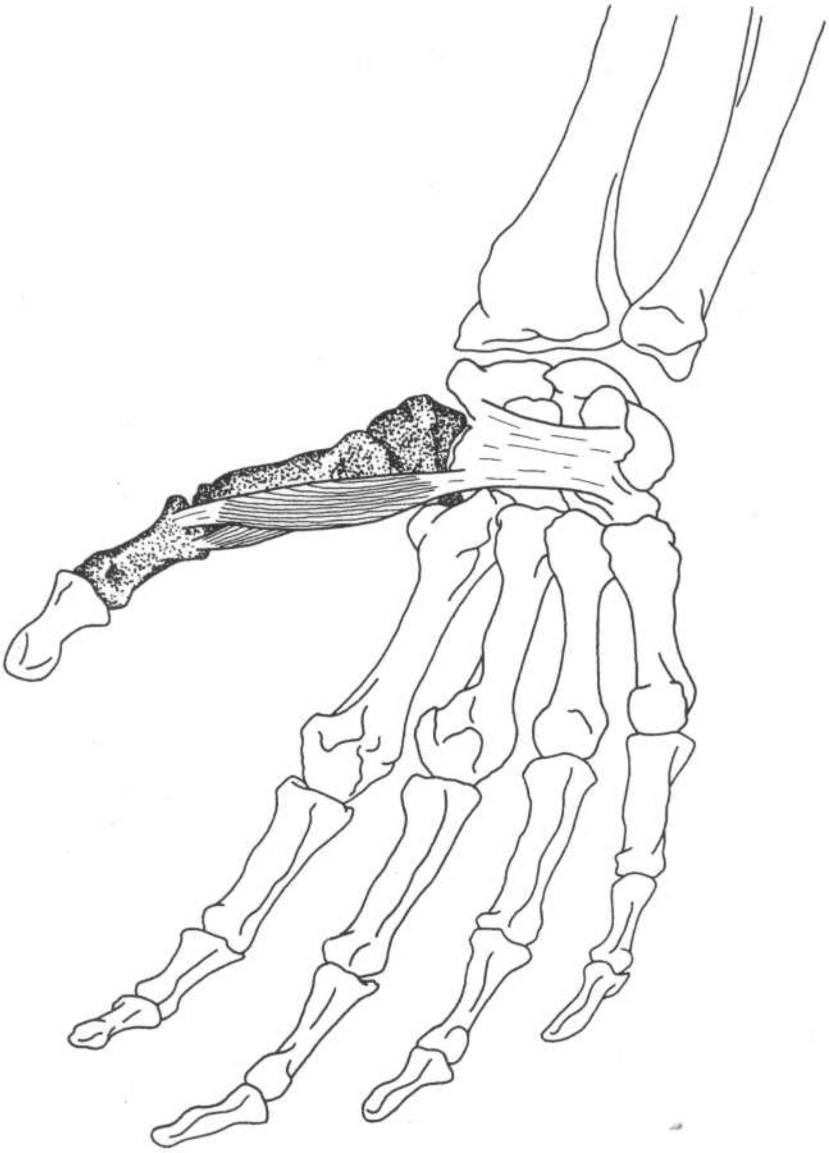
## Hand—palmar view

| | | | |
|---|---|---|---|
| **Origin** | Tubercle of scaphoid, tubercle of trapezium, flexor retinaculum | **Action** | Abducts thumb and moves it anteriorly, acts together with other muscles of thenar eminence to oppose thumb to other fingers |
| **Insertion** | Base of proximal phalanx of thumb | **Nerve** | Median (C6, C7) |

Note: The abductor pollicis brevis, flexor pollicis brevis, and opponens pollicis form the thenar eminence at the base of the thumb.

# FLEXOR POLLICIS BREVIS

*(Thenar eminence)*

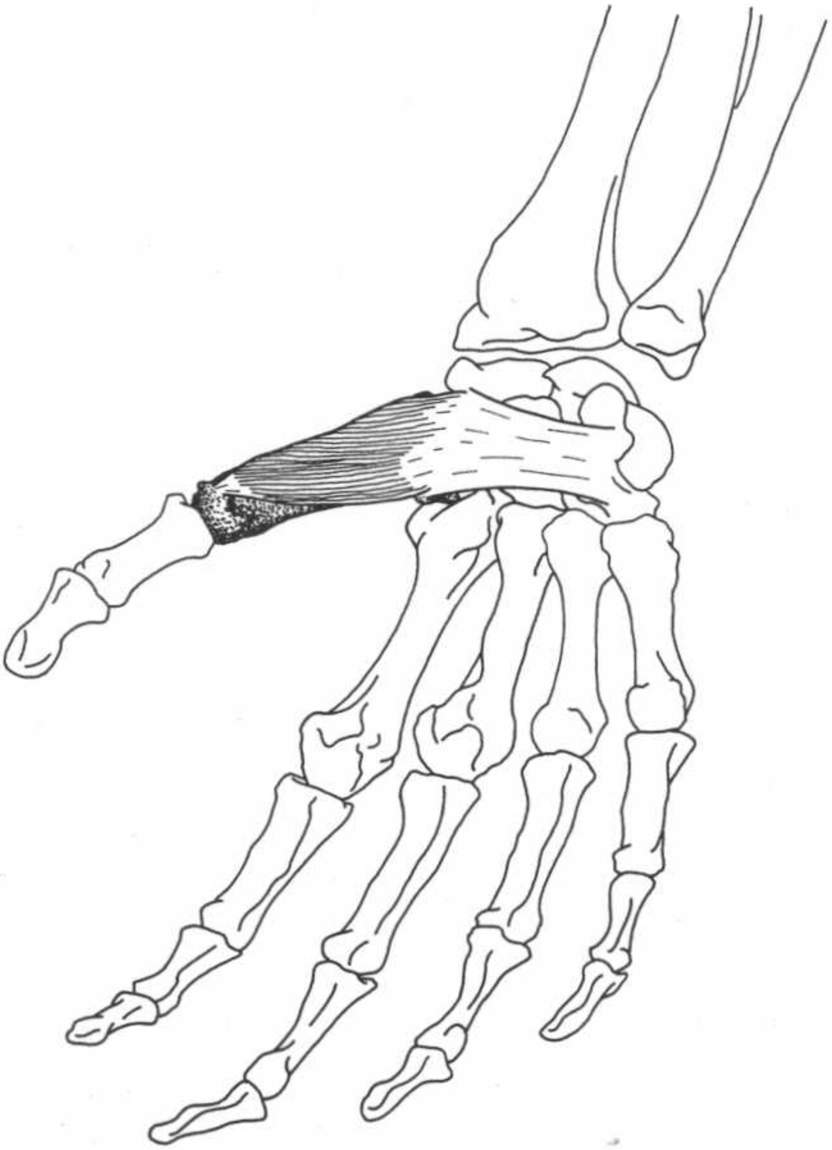


## Hand—palmar view

| | |
|---|---|
| **Origin** | Flexor retinaculum and trapezium, and first metacarpal bone |
| **Insertion** | Base of proximal phalanx of thumb |
| **Action** | Flexes metacarpophalangeal joint of thumb, assists in abduction and rotation of thumb, acts together with other muscles of thenar eminence to oppose thumb to other fingers |
| **Nerve** | Lateral portion—median nerve (C6, C7)<br>Medial portion—ulnar nerve (C8, T1) |

# OPPONENS POLLICIS

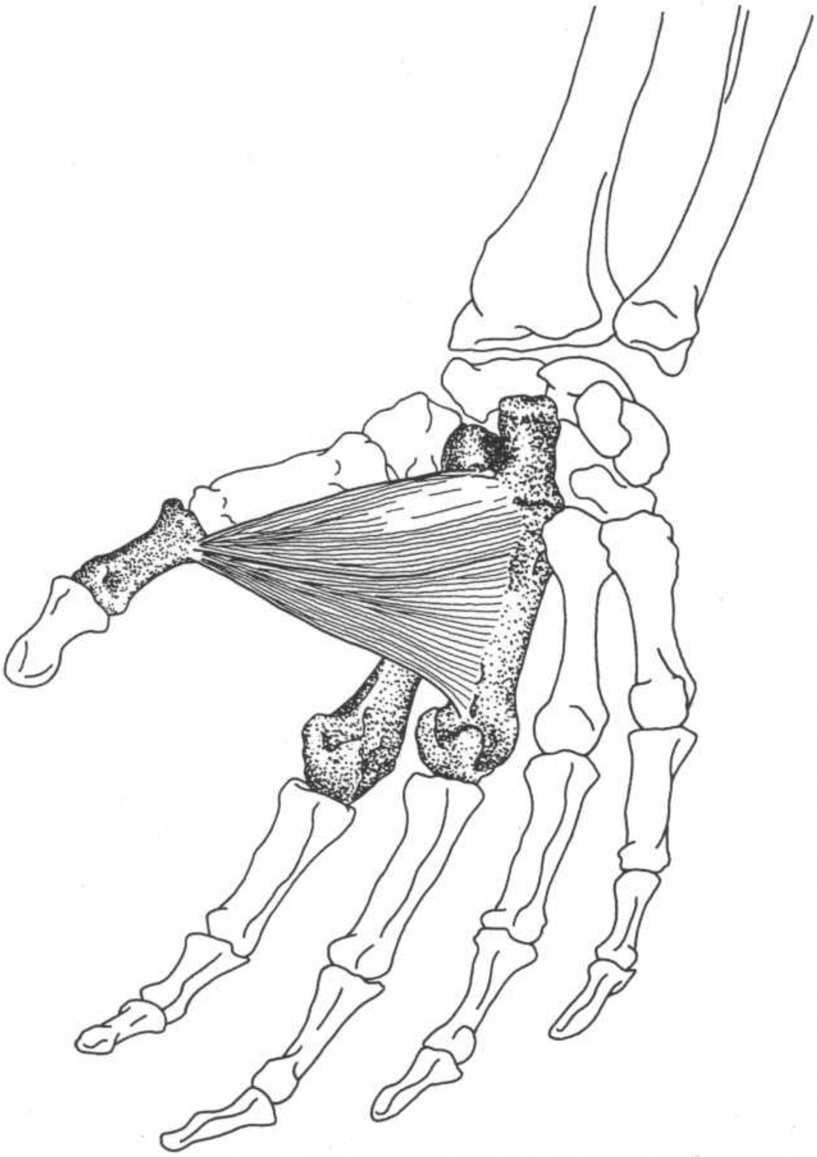
*(Thenar eminence)*



## Hand—palmar view

| | | | |
|---|---|---|---|
| **Origin** | Flexor retinaculum, tubercle of trapezium | **Action** | Rotates thumb into opposition with fingers, acts together with other muscles of thenar eminence to oppose thumb to other fingers |
| **Insertion** | Lateral border of first metacarpal bone | **Nerve** | Median nerve (C6, C7) |

# ADDUCTOR POLLICIS

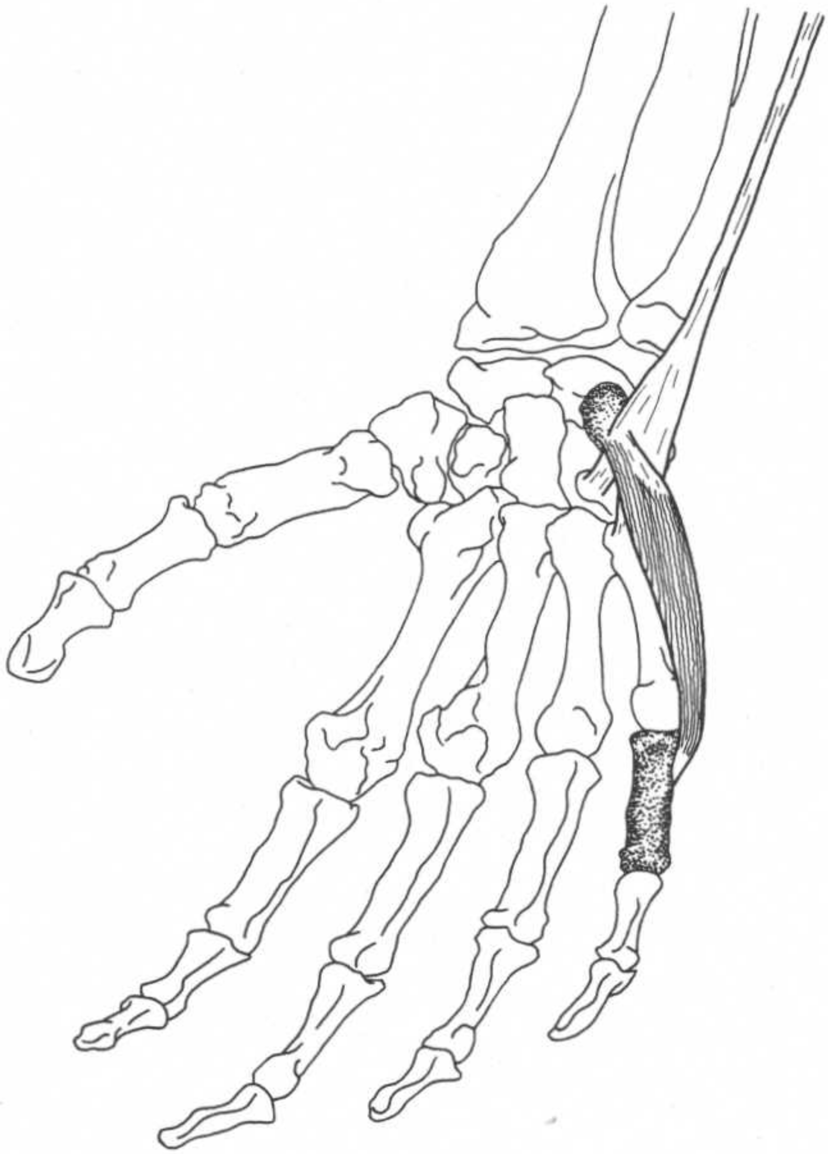


**Hand—palmar view**

| | |
|---|---|
| **igin** | Oblique head—anterior surfaces of second and third metacarpals, capitate, trapezoid<br>Transverse head—anterior surface of third metacarpal bone |
| **Insertion** | Medial side of base of proximal phalanx of the thumb |
| **Action** | Adducts thumb |
| **Nerve** | Ulnar nerve (C8, T1) |

# ABDUCTOR DIGITI MINIMI

*(Hypothenar eminence)*



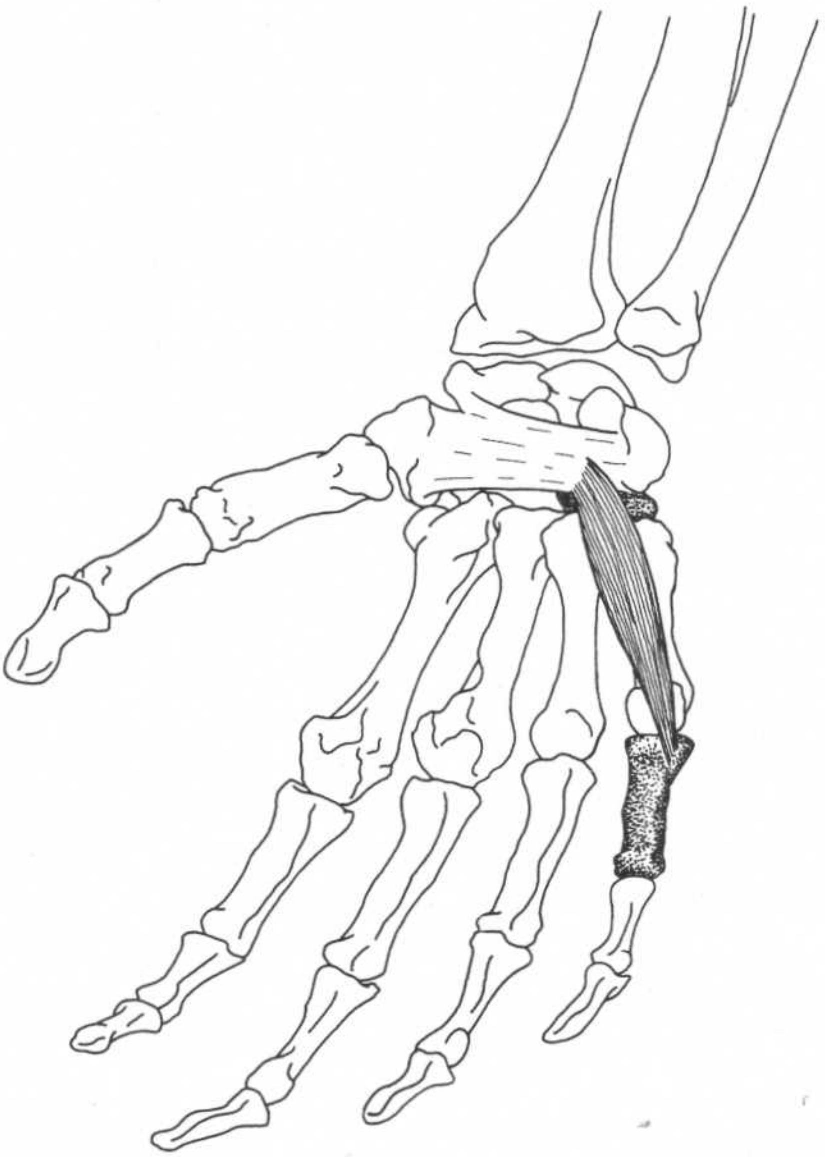
**Hand—palmar view**

| | | | |
|---|---|---|---|
| **Origin** | Pisiform bone, tendon of flexor carpi ulnaris | **Action** | Abducts fifth finger |
| **Insertion** | Medial side of base of proximal phalanx of fifth finger | **Nerve** | Ulnar nerve (C8, T1) |

Note: The hypothenar eminence is less prominent than the thenar eminence, and the fifth finger obviously cannot oppose the other digits.

# FLEXOR DIGITI MINIMI BREVIS

*(Hypothenar eminence)*

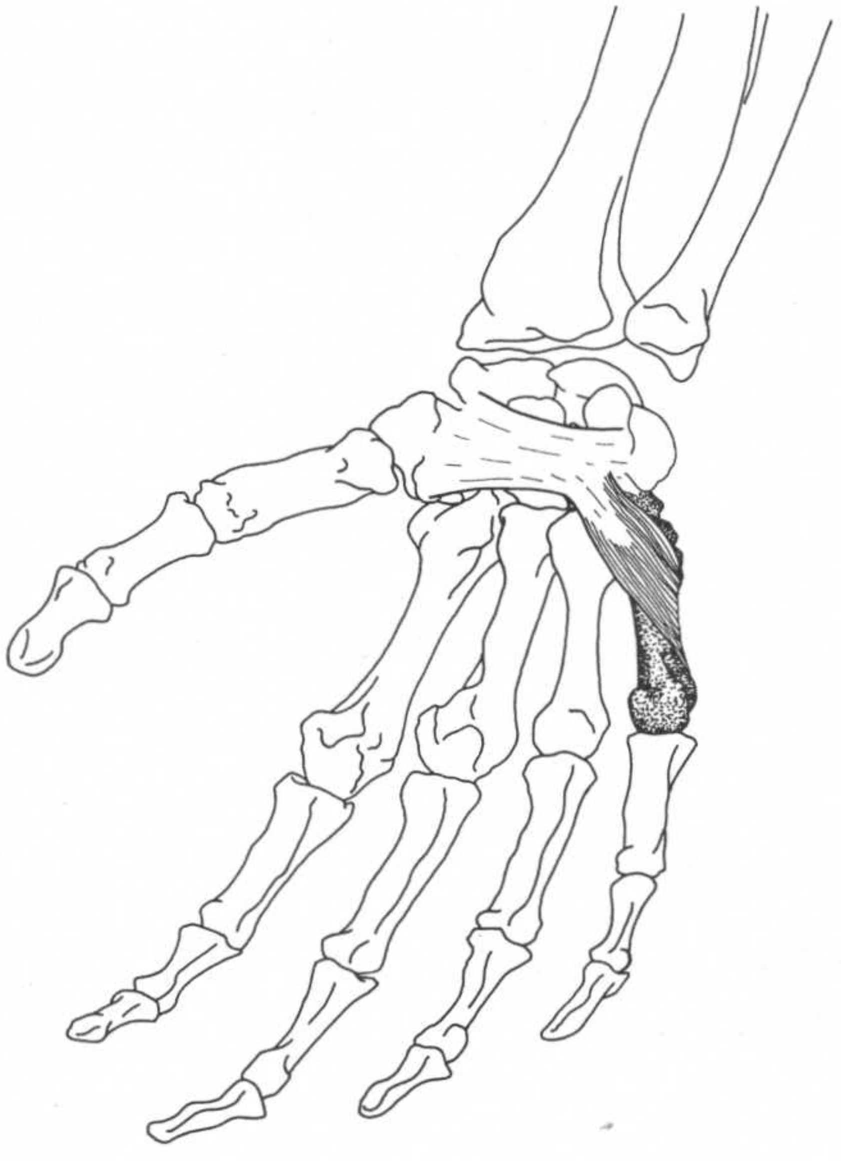


## Hand—palmar view

| | | | |
|---|---|---|---|
| **rigin** | Anterior surface of flexor retinaculum, hook of hamate | **Action** | Flexes fifth finger at metacarpophalangeal joint |
| **nsertion** | Medial side of base of proximal phalanx of fifth finger | **Nerve** | Ulnar nerve (C8, T1) |

# OPPONENS DIGITI MINIMI

*(Hypothenar eminence)*

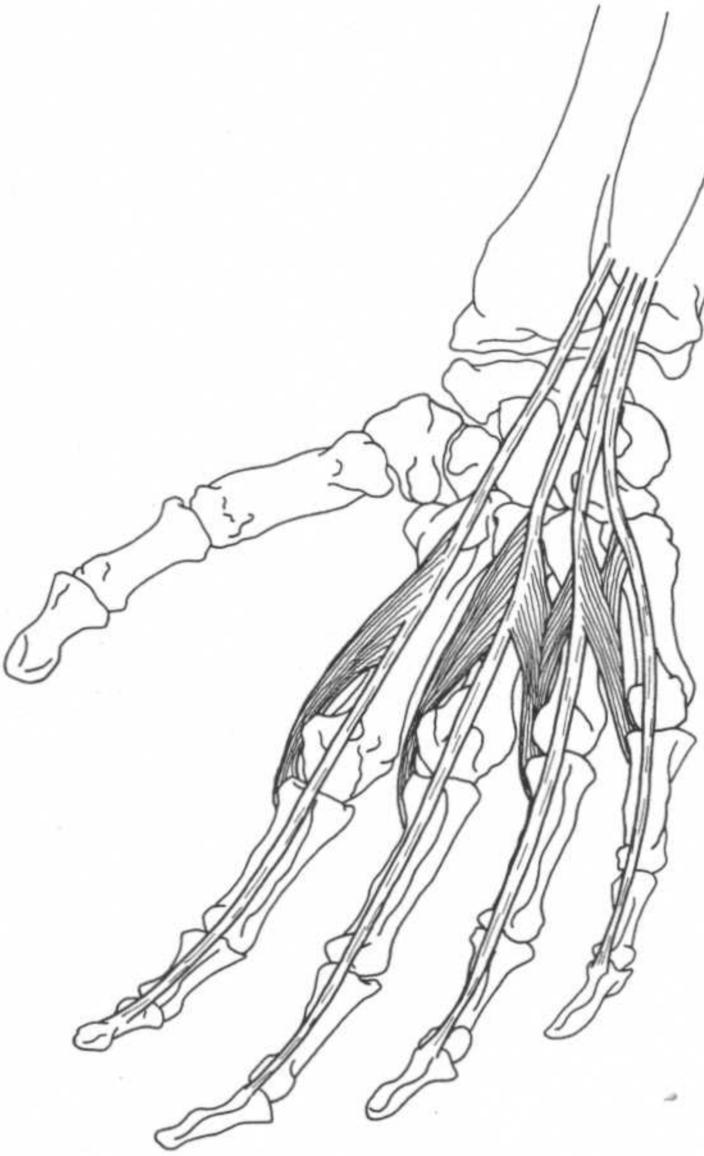


## Hand—palmar view

| | | | |
|---|---|---|---|
| **Origin** | Anterior surface of flexor retinaculum, hook of hamate | **Action** | Rotates fifth metacarpal bone, draws fifth metacarpal bone forward, assists flexor digiti minimi brevis in flexing carpometacarpal joint of fifth finger |
| **Insertion** | Whole length of medial border of fifth metacarpal bone | **Nerve** | Ulnar nerve (C8, T1) |

# LUMBRICALES*

*(Four muscles)*



## Hand—palmar view

| | |
|---|---|
| **Origin** | Tendons of flexor digitorum profundus in palm |
| **Insertion** | Lateral side of corresponding tendon of extensor digitorum on fingers |
| **Action** | Extend fingers at interphalangeal joints, weakly flex fingers at metacarpophalangeal joints |
| **Nerve** | Lateral lumbricals (first and second)—median nerve (C6, C7)<br>Medial lumbricals (third and fourth)—ulnar nerve (C8) |
| **Relationships** | Assist extensor digitorum communis in extending fingers without hyperextension at the metacarpophalangeal joints |

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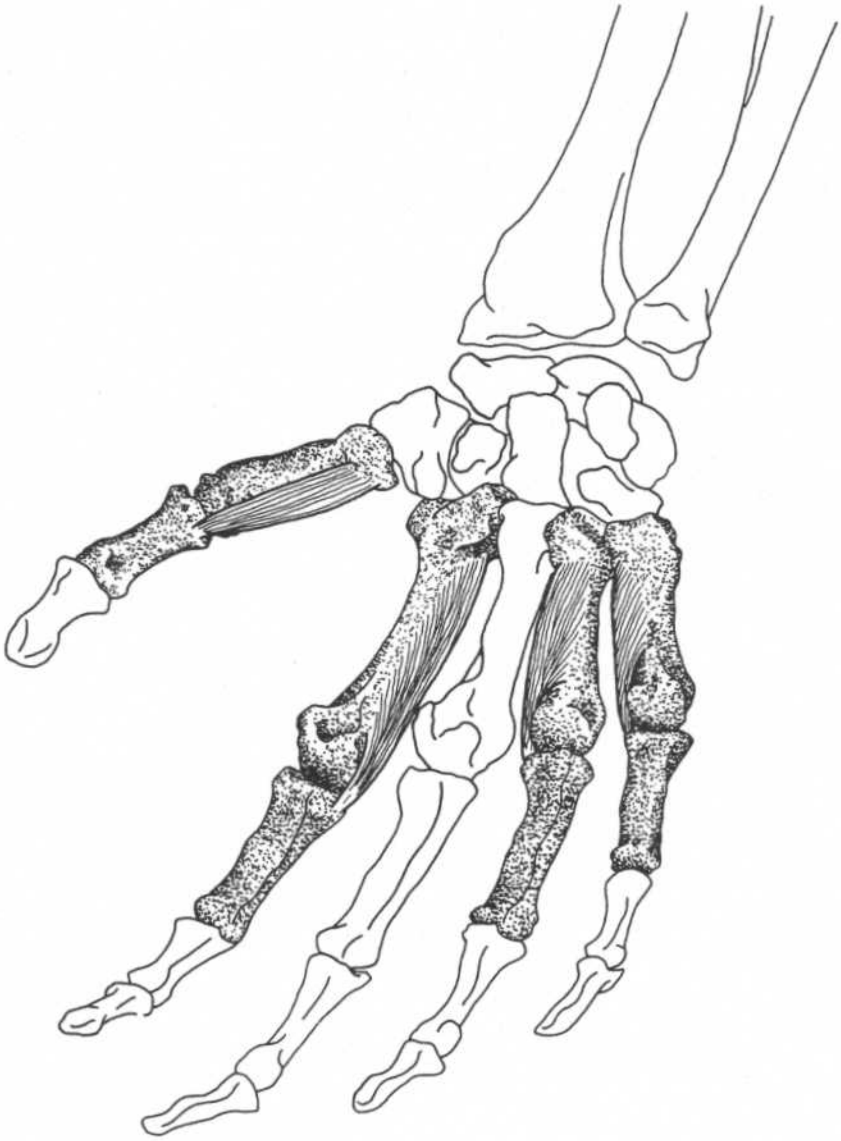
*Associated with the tendons of flexor digitorum profundus.

# PALMAR INTEROSSEI



**Hand—palmar view**

**Origin**
First—medial side of base of first metacarpal bone
Second, third, and fourth—anterior surfaces of second, fourth, and fifth metacarpal bones

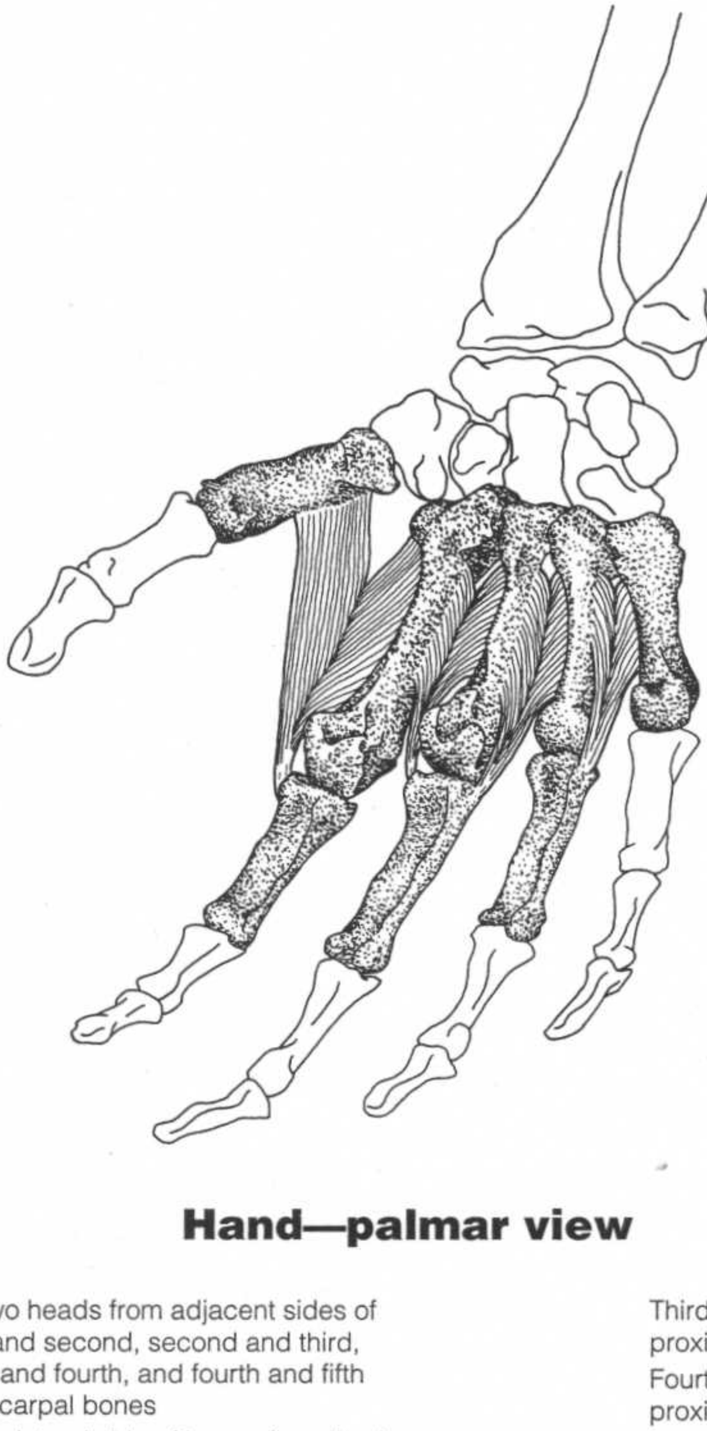
**Insertion**
First—medial side of base of proximal phalanx of thumb
Second—medial side of base of proximal phalanx of index finger
Third and fourth—lateral side of proximal phalanges of ring finger and fifth finger

**Action**
Adduct fingers toward center of third finger at metacarpophalangeal joints, assist in flexion of fingers at metacarpophalangeal joints

**Nerve**
Ulnar nerve (C8, T1)

Note: The palmar interosseus of the thumb, called the palmar interosseus of Henle, is usually absent.

# DORSAL INTEROSSEI

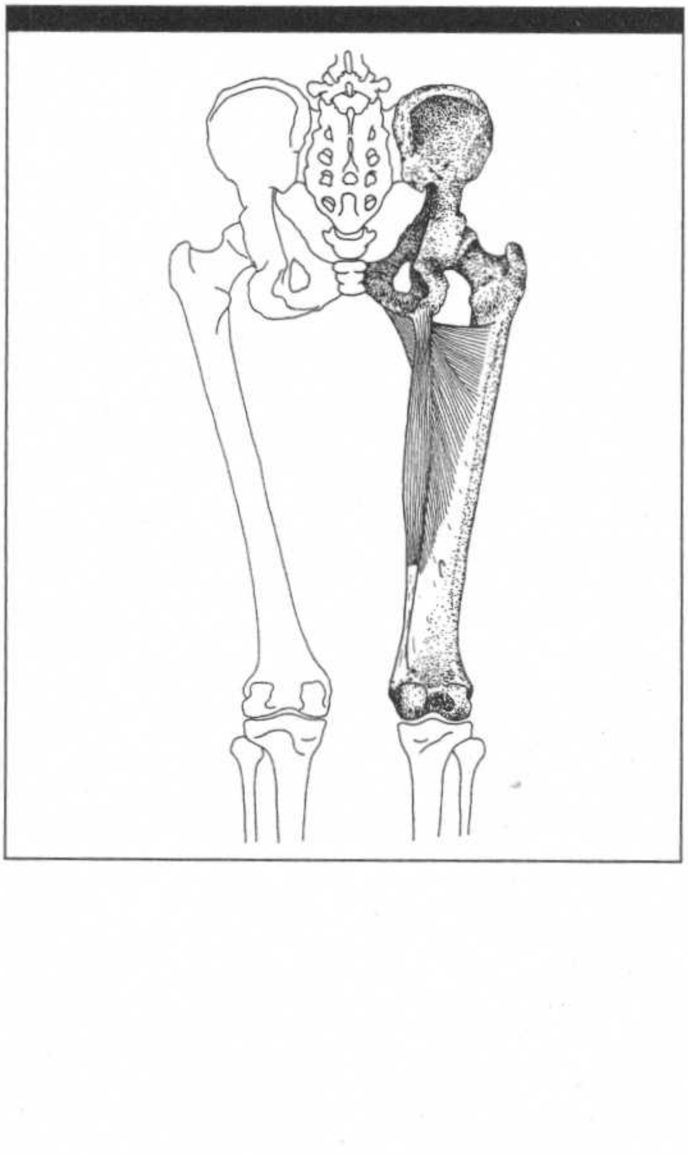


**Hand—palmar view**

| | |
|---|---|
| **Origin** | By two heads from adjacent sides of first and second, second and third, third and fourth, and fourth and fifth metacarpal bones |
| **Insertion** | First—lateral side of base of proximal phalanx of index finger<br>Second—lateral side of base of proximal phalanx of middle finger<br>Third—medial side of base of proximal phalanx of middle finger<br>Fourth—medial side of base of proximal phalanx of ring finger |
| **Action** | Abduct fingers away from center of third finger at metacarpophalangeal joints, assist in flexion of fingers at metacarpophalangeal joints |
| **Nerve** | Ulnar nerve (C8, T1) |

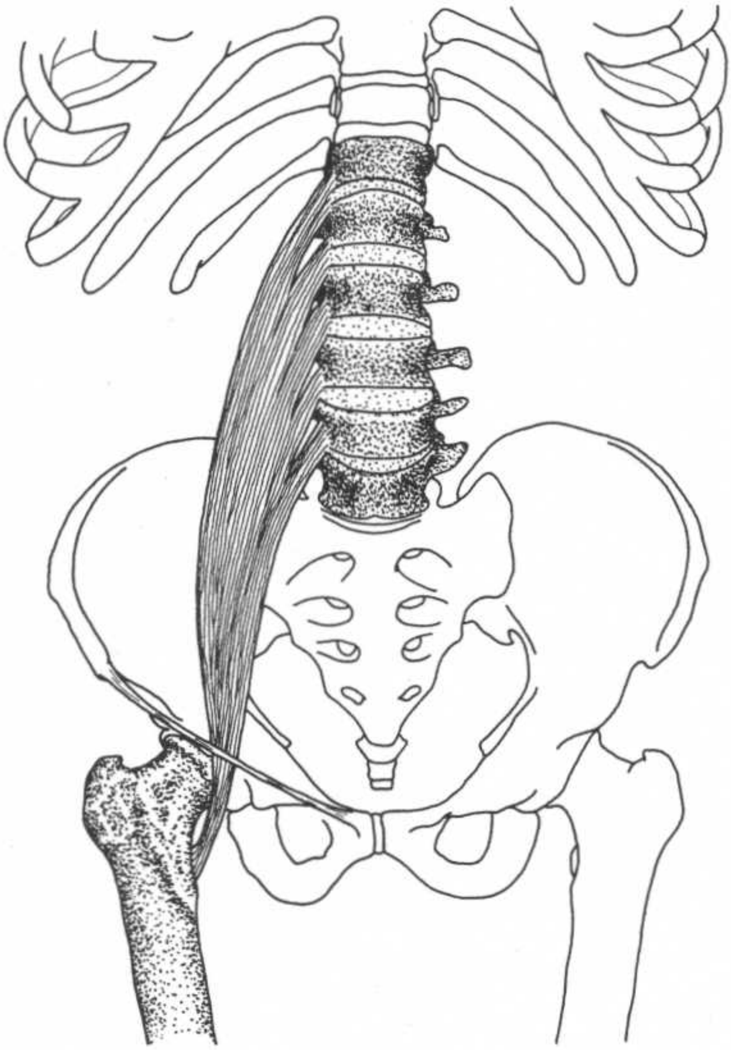
## CHAPTER EIGHT

# MUSCLES OF THE HIP AND THIGH



# PSOAS MAJOR

*(Part of iliopsoas)*



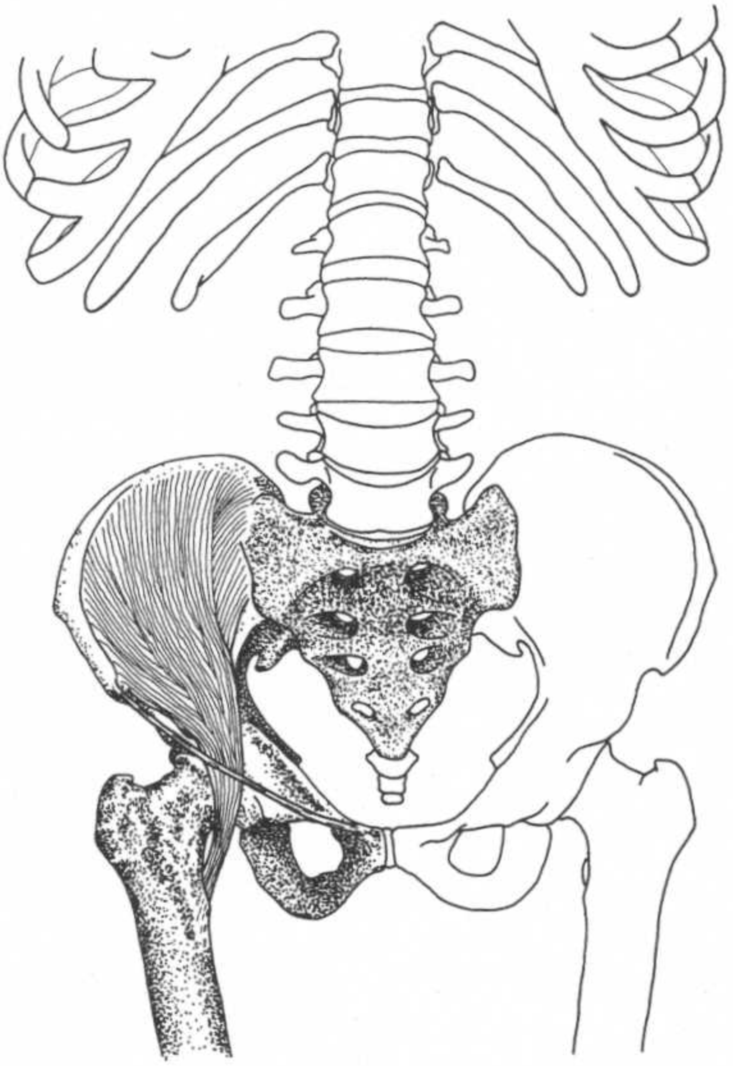
## Lumbar region, hip, and thigh—anterior view

| | |
|---|---|
| **Origin** | Bases of transverse processes of all lumbar vertebrae, bodies of twelfth thoracic and all lumbar vertebrae, intervertebral disks above each lumbar vertebra |
| **Insertion** | Lesser trochanter of femur |
| **Action** | Flexes thigh at hip joint, flexes vertebral column |
| **Nerve** | Branches from lumbar plexus (L2, L3) and sometimes L1 or L4 |

Note: Some upper fibers insert onto the hip bone from the arcuate line to the iliopectineal eminence to form the *psoas minor*. This muscle has little function and is frequently absent.

# ILIACUS

*(Part of iliopsoas)*

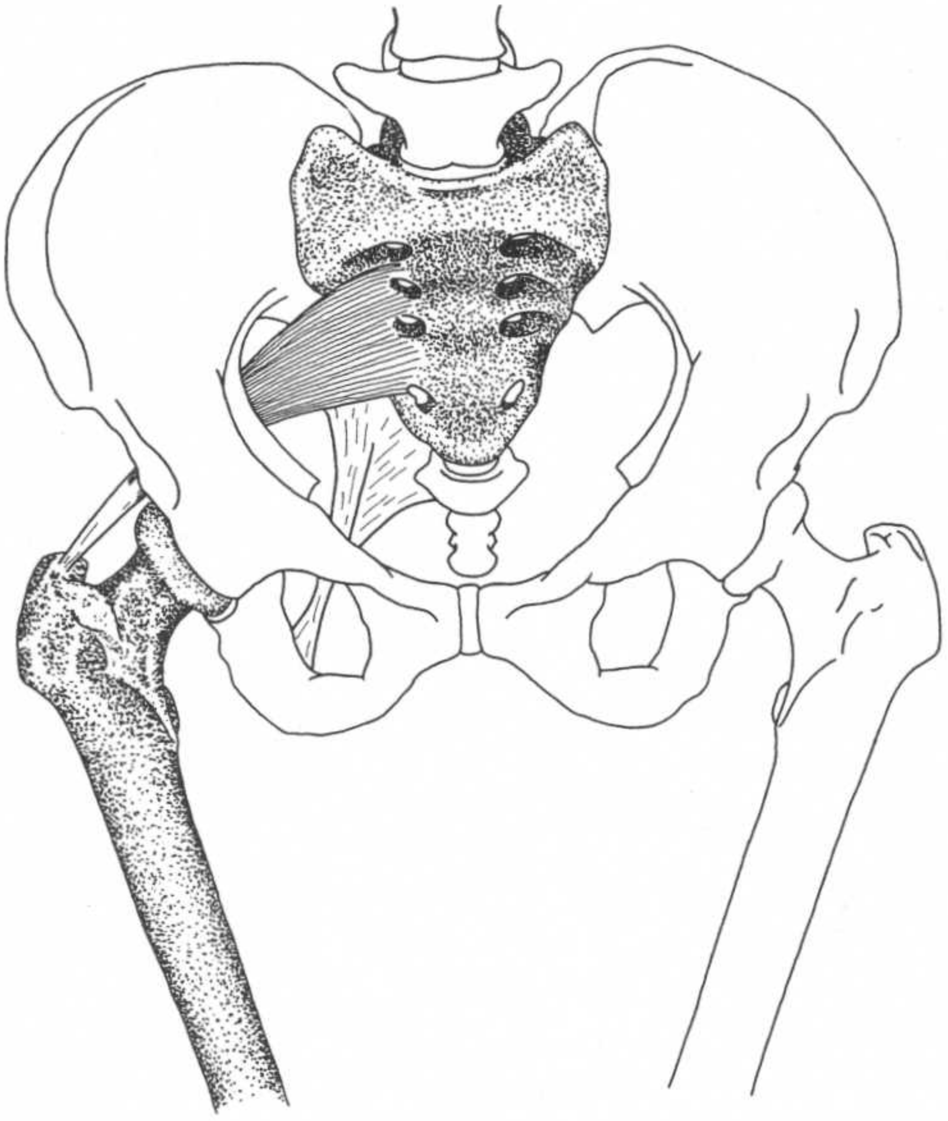


## Lumbar region, hip, and thigh—anterior view

| | | | |
|---|---|---|---|
| **Origin** | Upper two-thirds of iliac fossa, ala of sacrum and adjacent ligaments, anterior inferior iliac spine | **Action** | Flexes thigh at hip joint |
| | | **Nerve** | Femoral nerve (L2, L3) |
| **Insertion** | Onto tendon of psoas major, which continues into lesser trochanter of femur (together the two muscles form the iliopsoas) | | |

Note: The iliacus brings swinging leg forward in walking or running.

# PIRIFORMIS

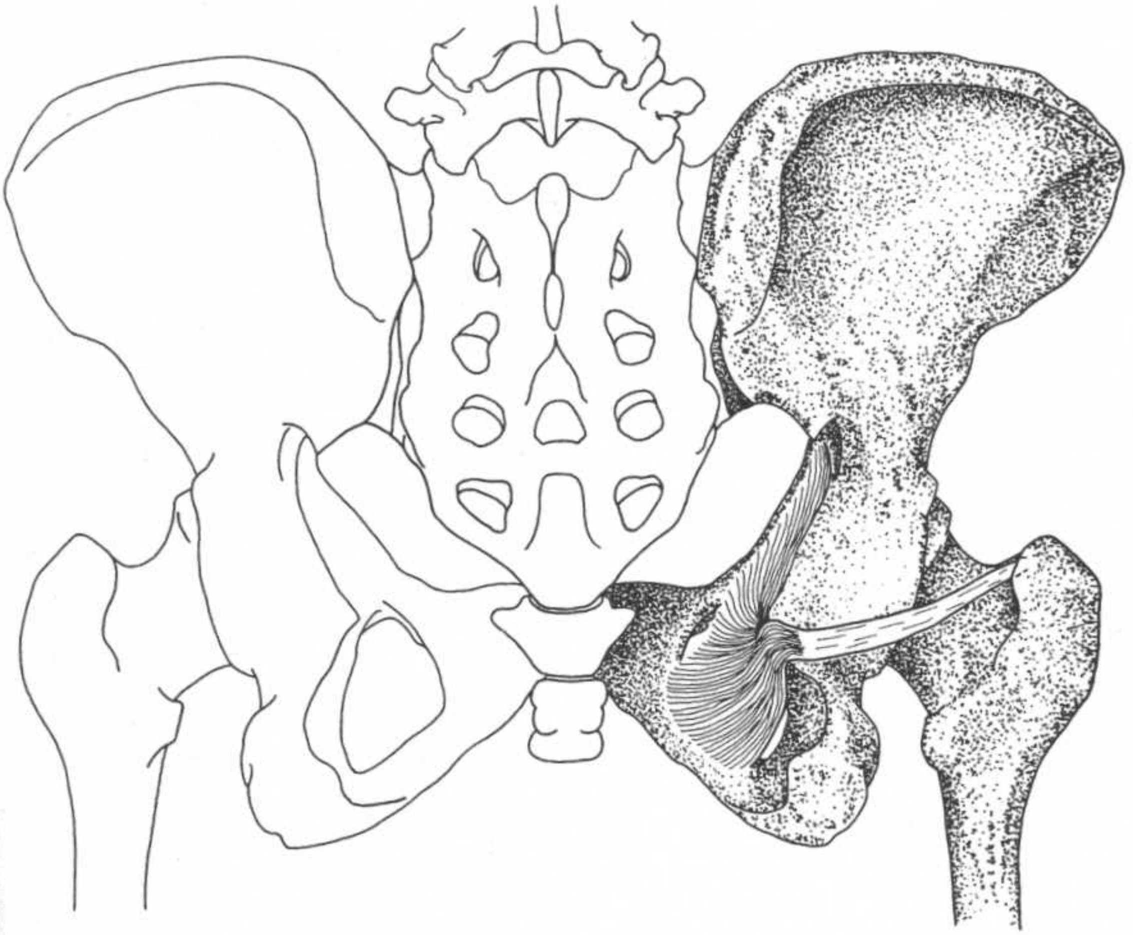


**Hip and thigh—anterior view**

| | | | |
|---|---|---|---|
| **Origin** | Internal surface of sacrum, sacrotuberous ligament | **Action** | Laterally rotates thigh at hip joint, abducts thigh |
| **Insertion** | Upper border of greater trochanter | **Nerve** | Anterior rami of first and second sacral nerves |

Note: The common peroneal part of the sciatic nerve may emerge through the belly of the piriformis instead of below its inferior border along with the tibial part.

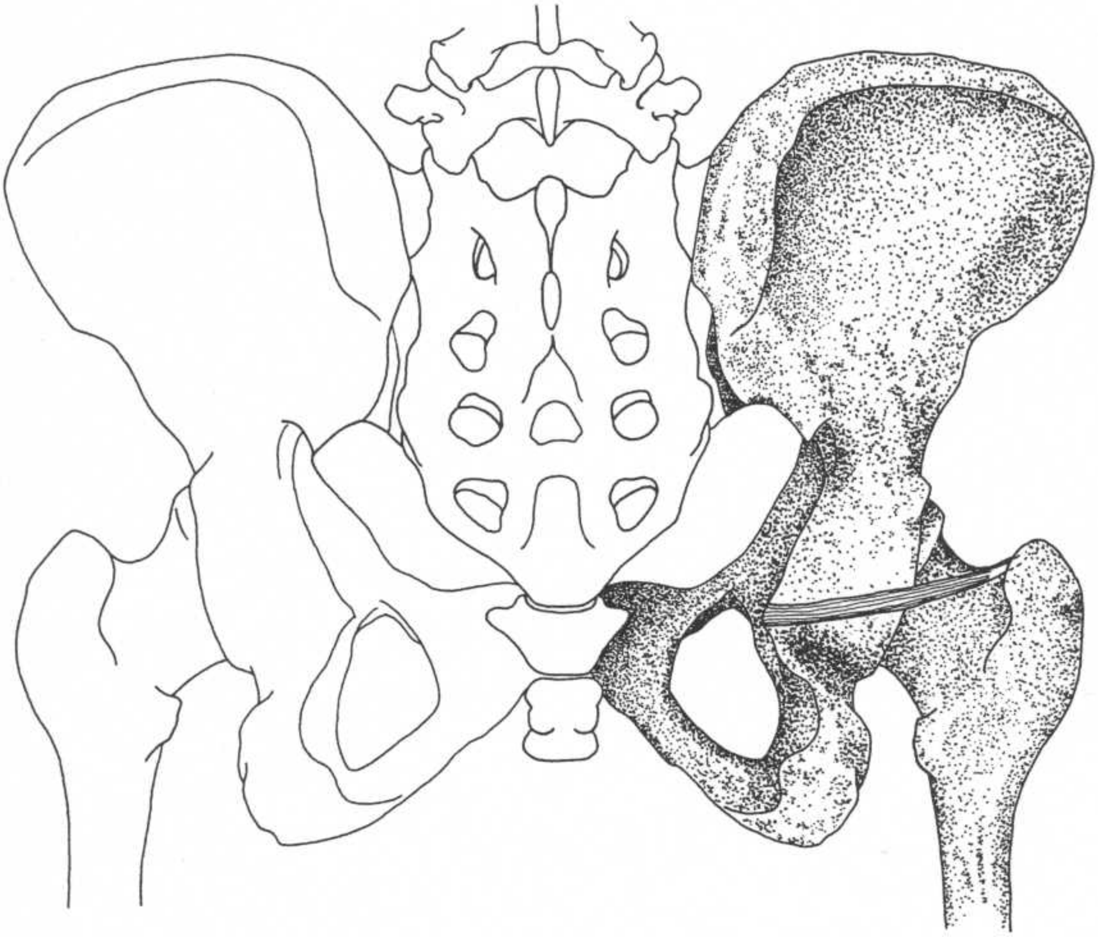
# OBTURATOR INTERNUS



Hip—posterior view

| | |
|---|---|
| **Origin** | Pelvic surface of obturator membrane and surrounding bones (ilium, ischium, pubis) |
| **Insertion** | Common tendon with superior and inferior gemelli to medial surface of greater trochanter |
| **Action** | Laterally rotates thigh at hip joint |
| **Nerve** | Nerve from sacral plexus (L5, S1–S3) |

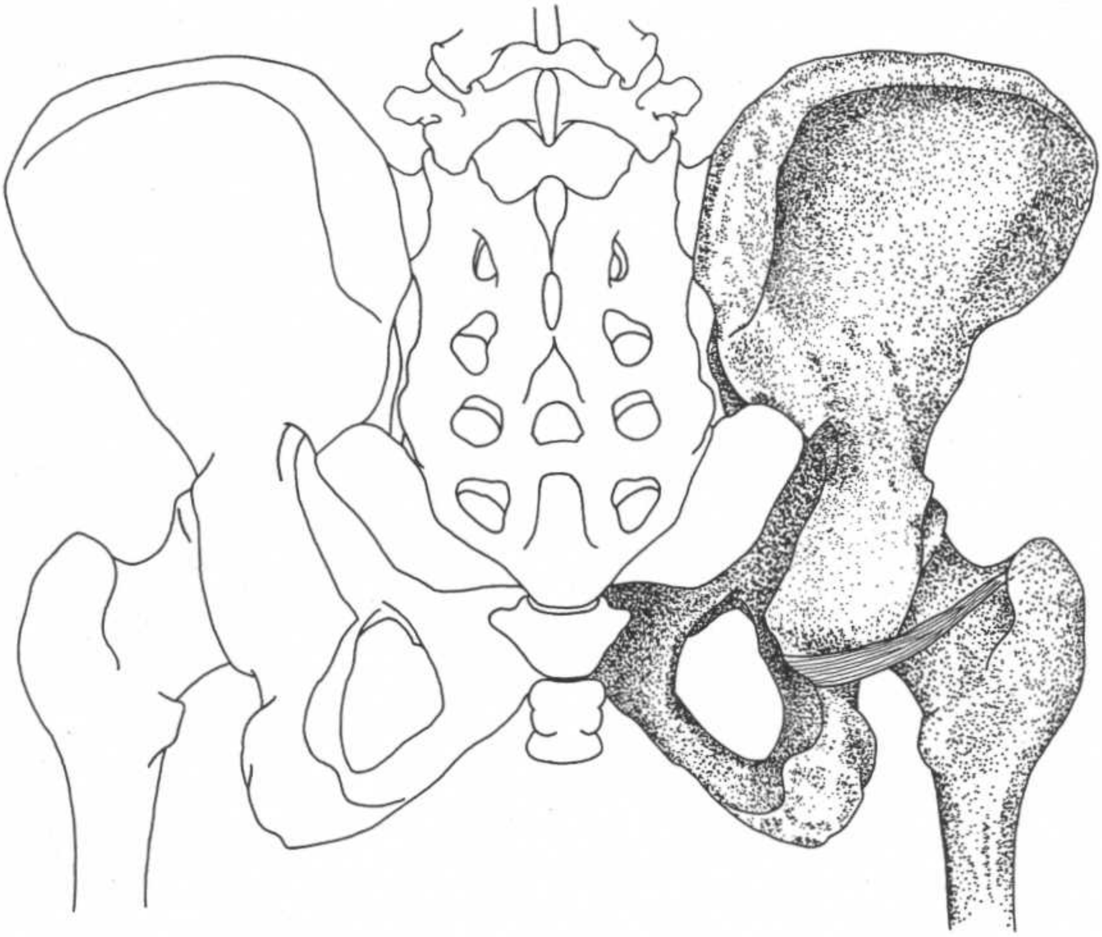
# GEMELLUS SUPERIOR



## Hip—posterior view

|  |  |  |  |
|---|---|---|---|
| **Origin** | Spine of ischium | **Action** | Laterally rotates thigh at hip joint |
| **Insertion** | With tendon of obturator internus into upper border of greater trochanter | **Nerve** | Branch of nerve to obturator internus from sacral plexus |

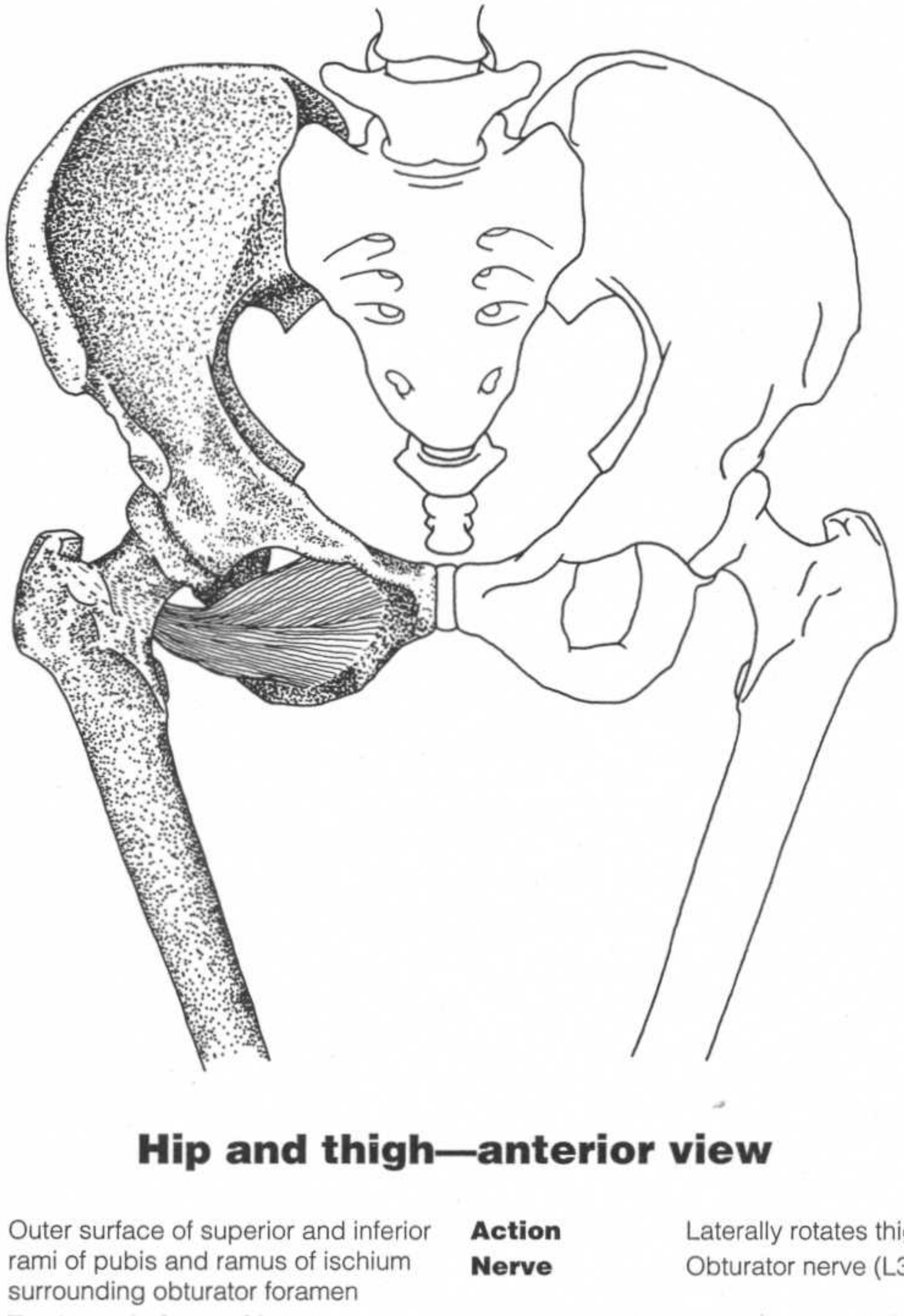
# GEMELLUS INFERIOR



**Hip—posterior view**

| | |
|---|---|
| **Origin** | Upper margin of ischial tuberosity |
| **Insertion** | With tendon of obturator internus into upper border of greater trochanter |
| **Action** | Laterally rotates thigh at hip joint |
| **Nerve** | Branch of nerve to quadratus femoris from sacral plexus |

# OBTURATOR EXTERNUS

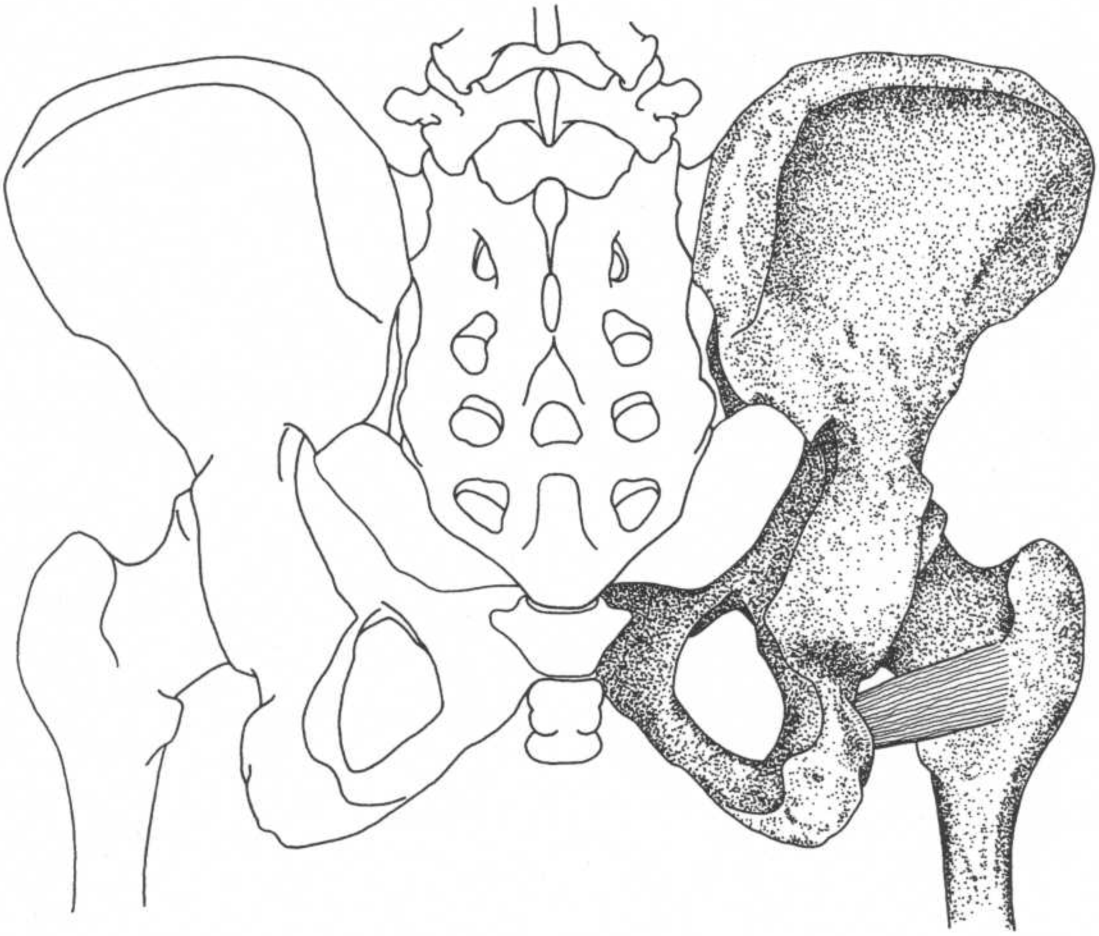


**Hip and thigh—anterior view**

| | |
|---|---|
| **rigin** | Outer surface of superior and inferior rami of pubis and ramus of ischium surrounding obturator foramen |
| **sertion** | Trochanteric fossa of femur |
| **Action** | Laterally rotates thigh |
| **Nerve** | Obturator nerve (L3, L4) |

Note: Part of this muscle can be seen posteriorly by separating the gemellus inferior and quadratus femoris. It is deep within this cleft.

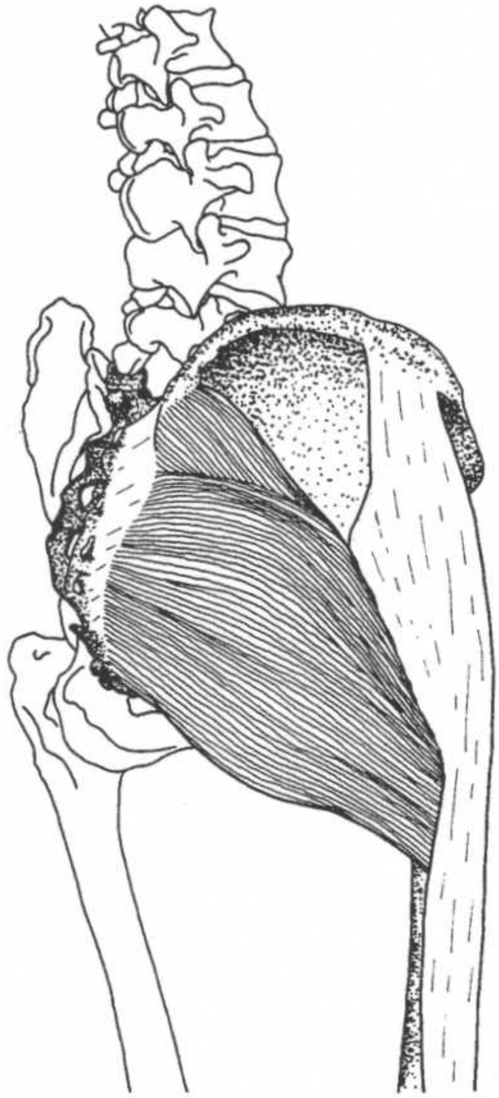
# QUADRATUS FEMORIS



Hip and thigh—posterior view

| | | | |
|---|---|---|---|
| **Origin** | Lateral border of ischial tuberosity | **Action** | Laterally rotates thigh at hip joint |
| **Insertion** | Below intertrochanteric crest (quadrate line) | **Nerve** | Branch from sacral plexus (L5, S1) |

# GLUTEUS MAXIMUS

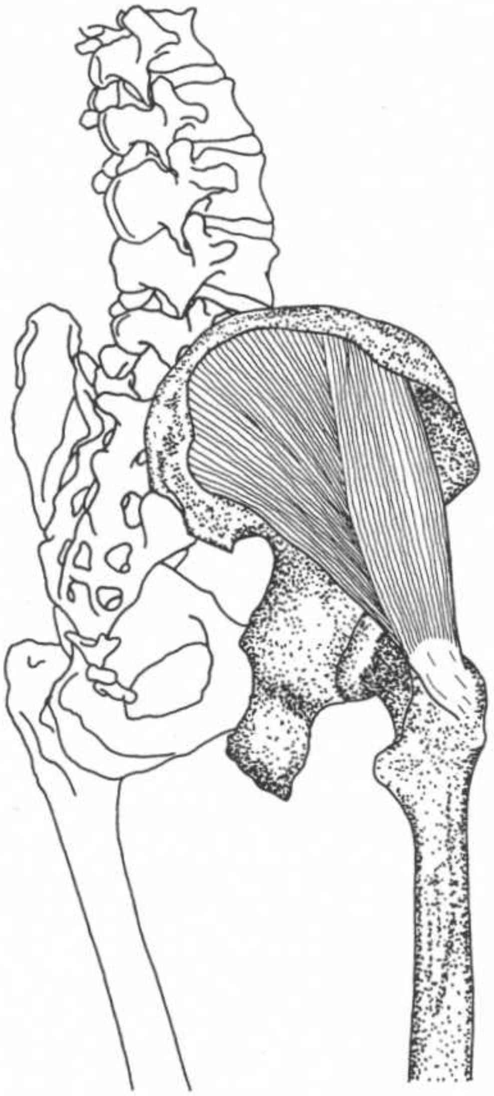


**Hip and thigh—lateral view**

| | |
|---|---|
| **gin** | Outer surface of ilium behind posterior gluteal line, adjacent posterior surface of sacrum and coccyx, sacrotuberous ligament, aponeurosis of erector spinae (sacrospinalis) |
| **ertion** | Iliotibial tract of fascia lata, gluteal tuberosity of femur |
| **Action** | Upper part—abducts, laterally rotates thigh<br>Lower part—extends, laterally rotates thigh, extends trunk, assists in adduction of thigh |
| **Nerve** | Inferior gluteal nerve (L5, S1, S2) |

Note: This is not a postural muscle; it is not used in walking but only in forceful extension, as in running, climbing, or rising from a seated position.

# GLUTEUS MEDIUS

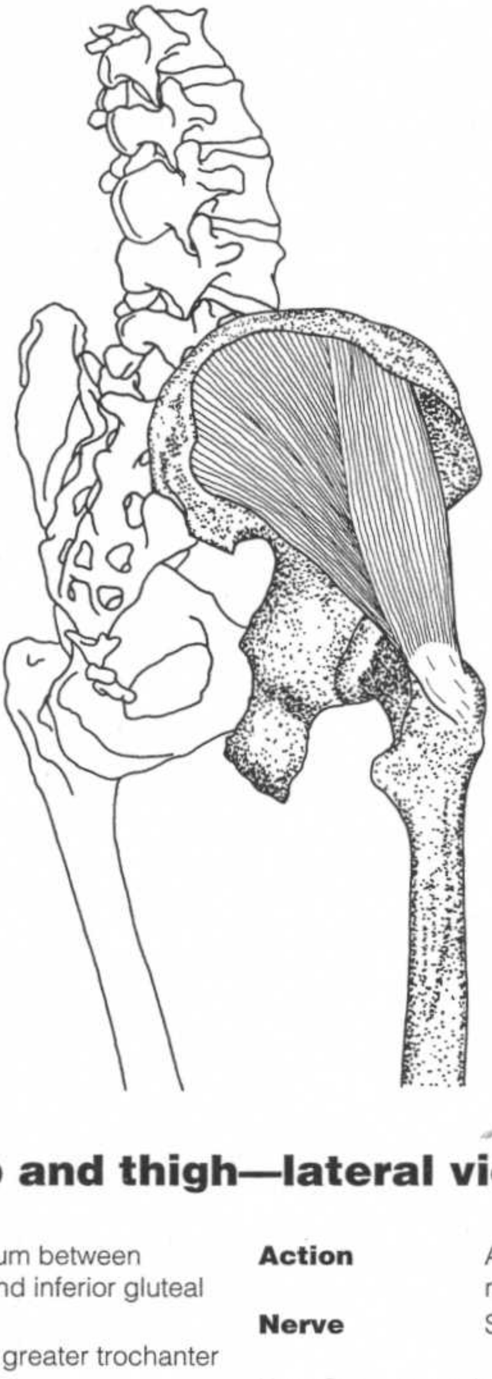


**Hip and thigh—lateral view**

| | | | |
|---|---|---|---|
| **Origin** | Outer surface of ilium inferior to iliac crest | **Action** | Abducts femur at hip joint and rotates thigh medially |
| **Insertion** | Lateral surface of greater trochanter | **Nerve** | Superior gluteal nerve (L4, L5, S1) |

Note: In locomotion, this muscle (along with the gluteus minimus) prevents the pelvis from dropping (adduction of thigh) toward the opposite swinging leg.

# GLUTEUS MINIMUS

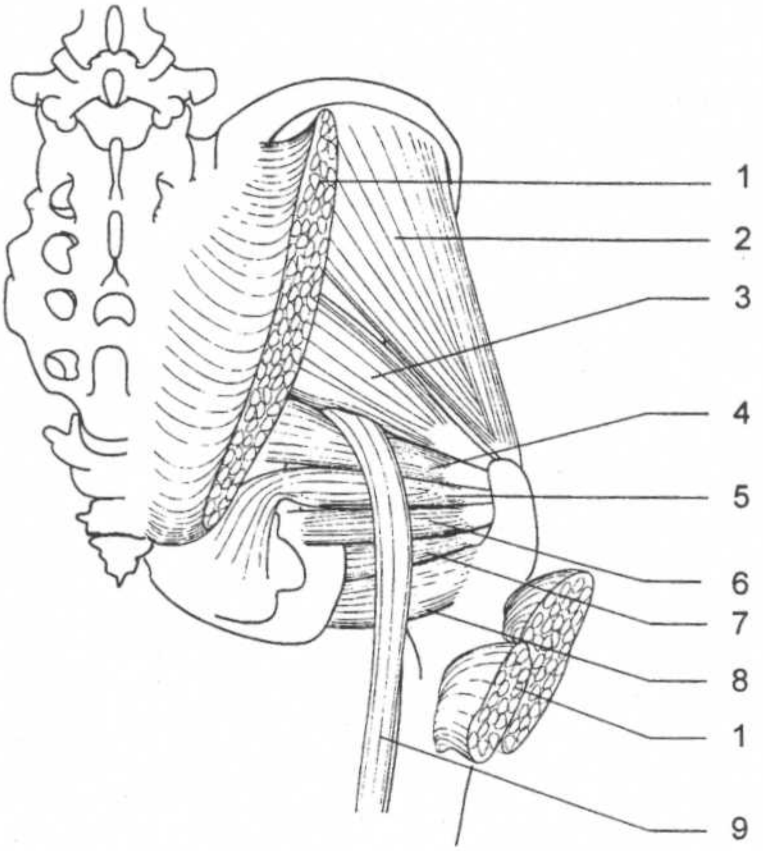


**Hip and thigh—lateral view**

| | |
|---|---|
| **Origin** | Outer surface of ilium between middle (anterior) and inferior gluteal lines |
| **Insertion** | Anterior surface of greater trochanter |
| **Action** | Abducts femur at hip joint and rotates thigh medially |
| **Nerve** | Superior gluteal nerve (L4, L5, S1) |

Note: See note on gluteus medius.

# MUSCLES OF THE HIP



Hip—posterior view

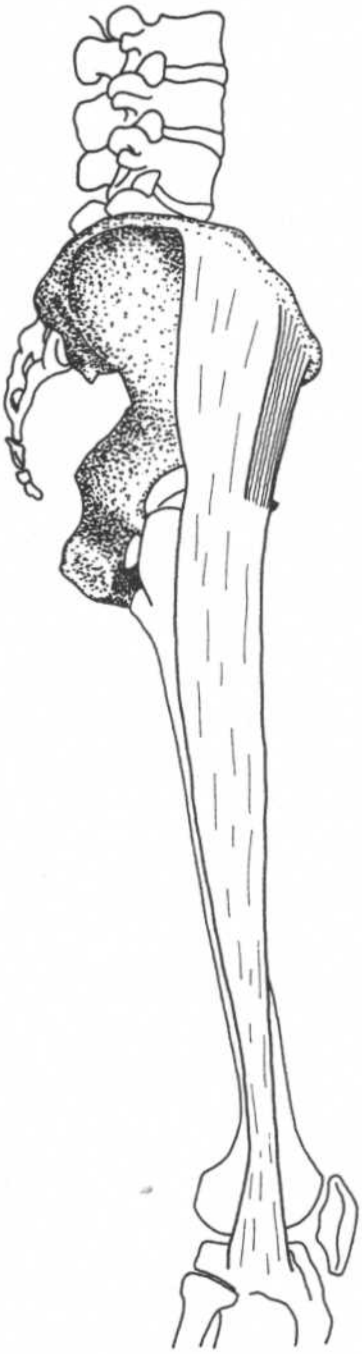
1. Gluteus maximus (cut)
2. Gluteus medius
3. Piriformis
4. Gemellus superior
5. Obturator internus
6. Gemellus inferior
7. Obturator externus
8. Quadratus femoris
9. Sciatic nerve

Note: Gemellus inferior and quadratus femoris have been shown separated to expose the deeply placed obturator externus.

# TENSOR FASCIAE LATAE

| | |
|---|---|
| **gin** | Outer edge of iliac crest between anterior superior iliac spine and iliac tubercle |
| **ertion** | Iliotibial tract on upper part of thigh |
| **tion** | Flexes, abducts thigh |
| **rve** | Superior gluteal nerve (L4, L5, S1) |

: This muscle, along with gluteus maximus, draws the ia lata upward, stabilizing the knee.

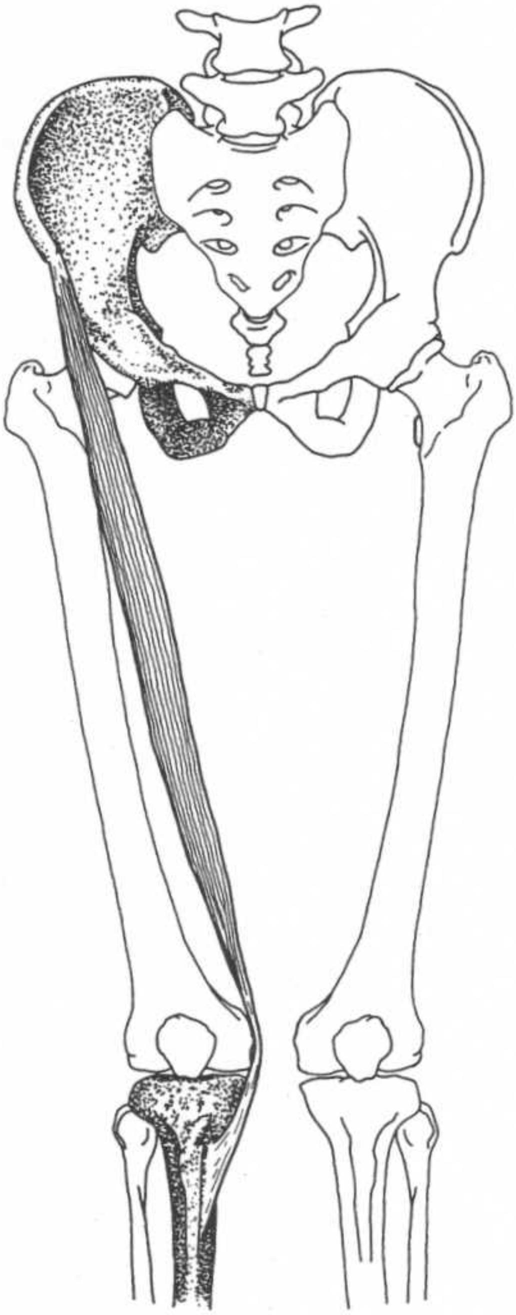


**Hip and thigh—lateral view**

# SARTORIUS

| | |
|---|---|
| **Origin** | Anterior superior iliac spine and area immediately below it |
| **Insertion** | Upper part of medial surface of shaft of tibia |
| **Action** | Flexes, abducts, and laterally rotates thigh at hip joint, flexes and slightly medially rotates leg at knee joint after flexion |
| **Nerve** | Femoral nerve (L2, L3) |
| **Relationships** | Insertions of sartorius, gracilis, and semitendinosus fuse on the medial tibia; these tendons, called the pes anserinus (goose foot), give medial support to the knee |

Note: This muscle is used to bring swinging leg forward in walking and running.



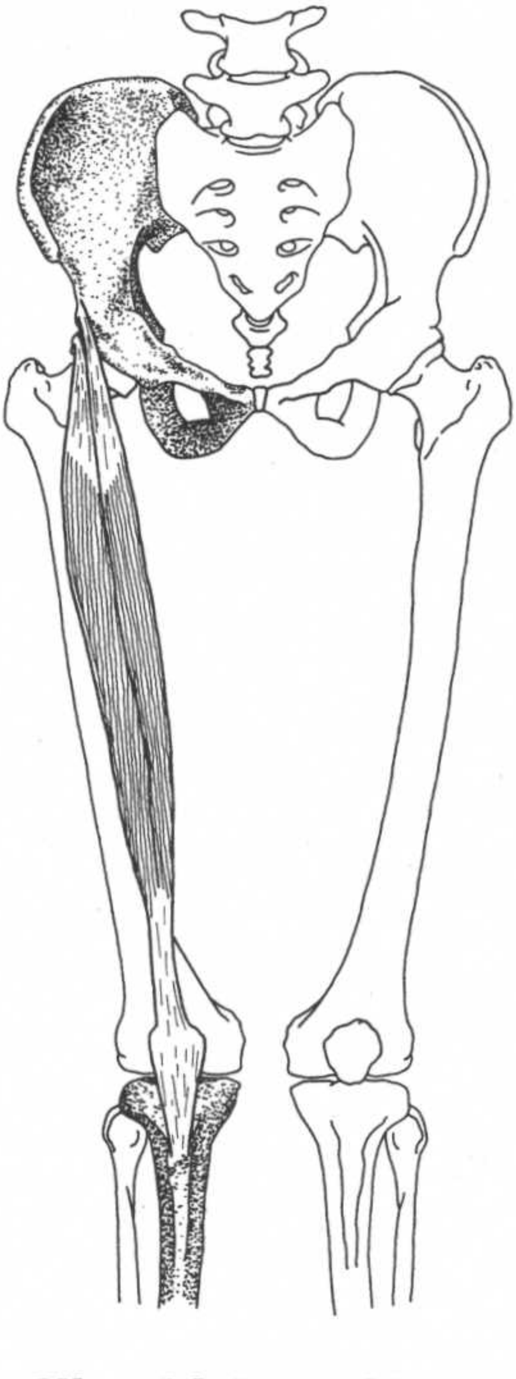
**Hip, thigh, and leg—anterior view**

# RECTUS FEMORIS

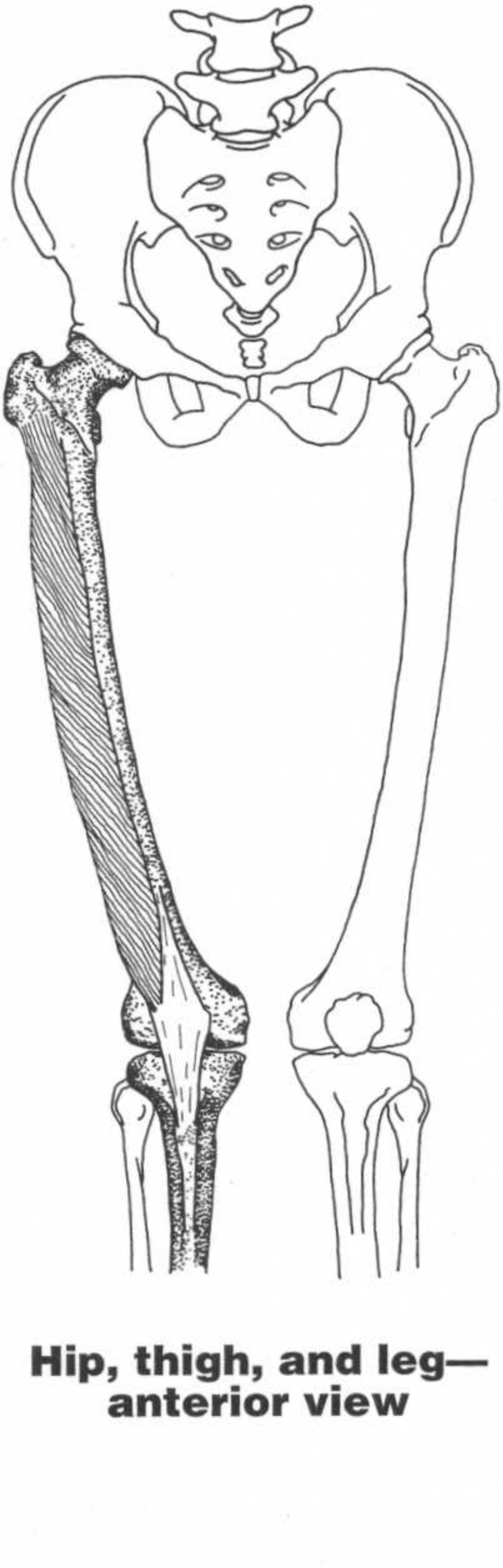
*(One of quadriceps femoris)*

| | |
|---|---|
| **Origin** | Anterior head—anterior inferior iliac spine<br>Posterior head—ilium above acetabulum |
| **nsertion** | Patella, then by patellar ligament to tuberosity of the tibia |
| **Action** | Extends leg at knee joint, flexes thigh at hip joint |
| **Nerve** | Femoral nerve (L2–L4) |

Note: This muscle is used when thigh flexion and leg xtension are needed together, such as in kicking a football. n walking, the quadriceps prevent the knee from flexing uring heel strike and early support phase.



**Hip, thigh, and leg—anterior view**



Hip, thigh, and leg—
anterior view

# VASTUS LATERALIS

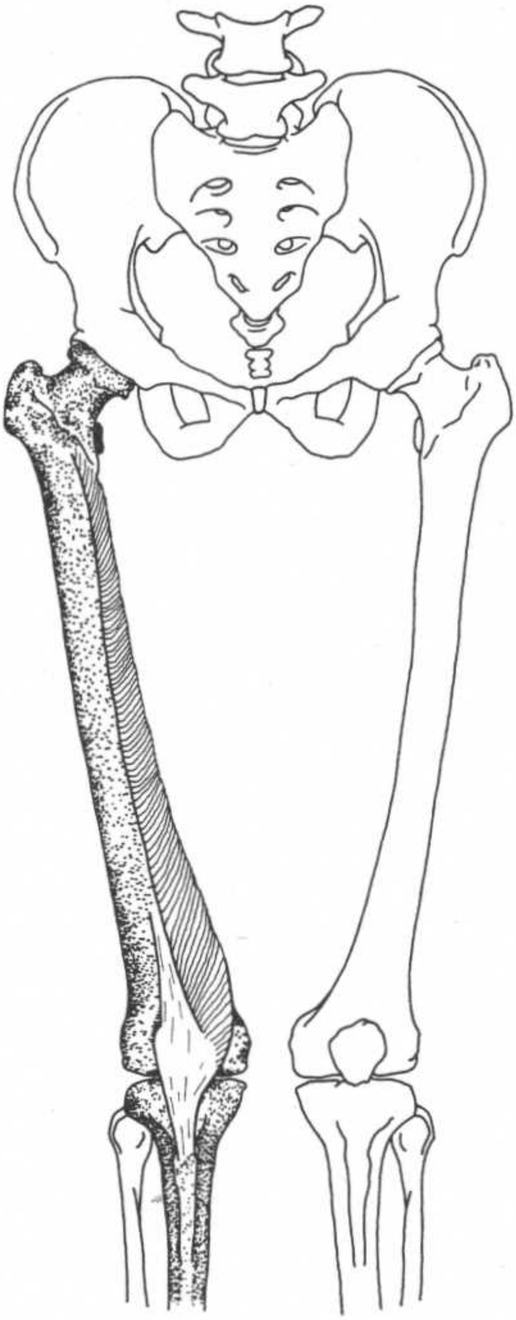
*(One of quadriceps femoris)*

| | |
|---|---|
| **Origin** | Intertrochanteric line, inferior border of greater trochanter, gluteal tuberosity, lateral lip of linea aspera of femur |
| **Insertion** | Lateral margin of patella, then by patellar ligament to tuberosity of tibia |
| **Action** | Extends leg at knee joint |
| **Nerve** | Femoral nerve (L2–L4) |

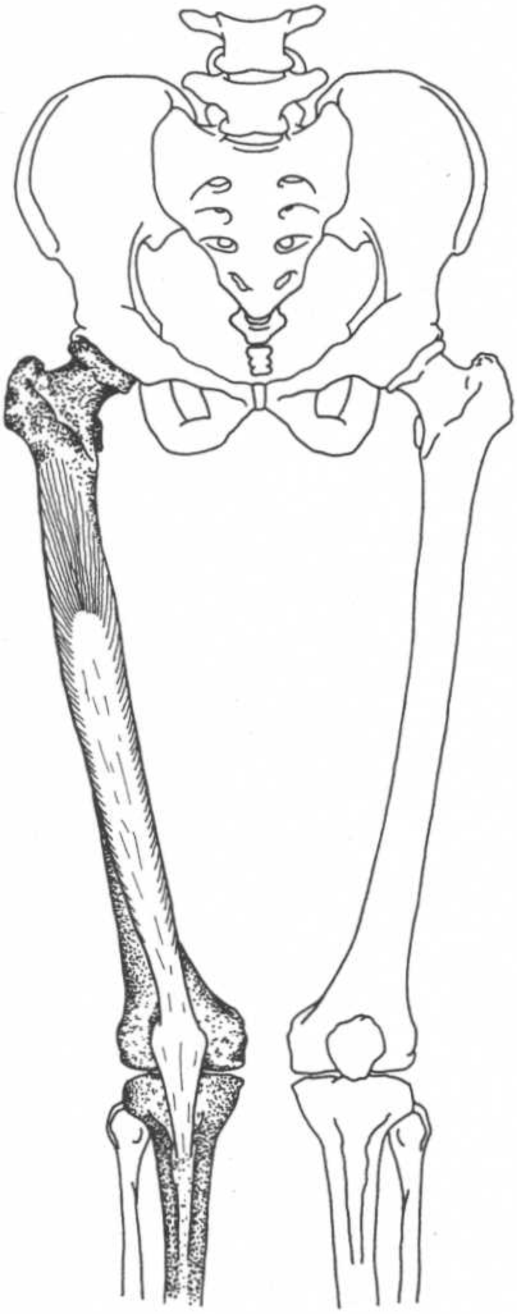
# VASTUS MEDIALIS

*(One of quadriceps femoris)*

| | |
|---|---|
| **Origin** | Intertrochanteric line, medial lip of linea aspera of femur, medial intermuscular septum, medial supracondylar line |
| **Insertion** | Medial border of the patella, then by patellar ligament into tibial tuberosity, medial condyle of tibia |
| **Action** | Extends leg at knee joint |
| **Nerve** | Femoral nerve (L2–L4) |



**Hip, thigh, and leg—anterior view**



Hip, thigh, and leg—anterior view

# VASTUS INTERMEDIUS

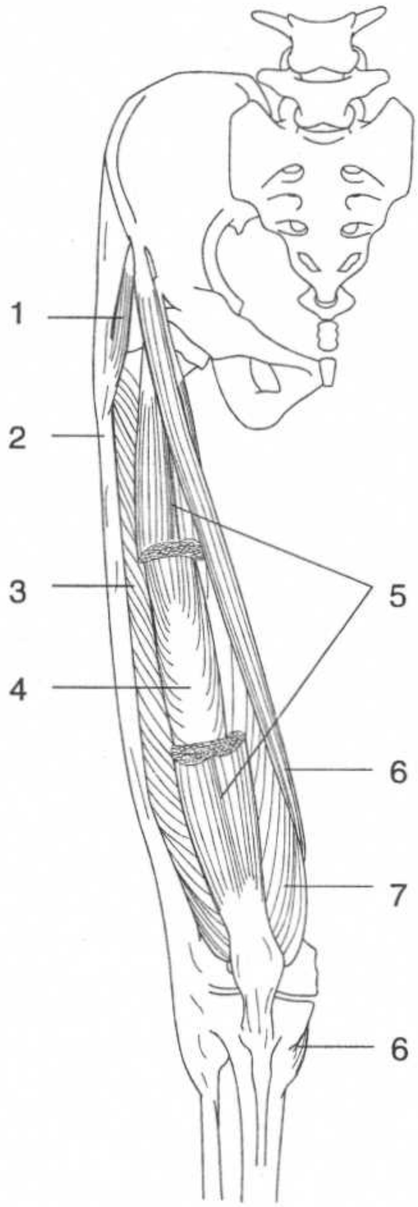
*(One of quadriceps femoris)*

| | |
|---|---|
| **Origin** | Anterior and lateral surfaces of upper two-thirds of femur, lateral intermuscular septum, linea aspera, lateral supracondylar line |
| **Insertion** | Deep aspect of quadriceps tendon, then through patella to tibial tuberosity |
| **Action** | Extends leg at knee joint |
| **Nerve** | Femoral nerve (L2–L4) |

Note: A few bundles of fibers from this muscle insert onto the upper part of the joint capsule of the knee. They probably draw the capsule superiorly during extension of the leg, preventing it from binding in the joint. They are called *articularis genus.*

# MUSCLES OF THE ANTERIOR THIGH

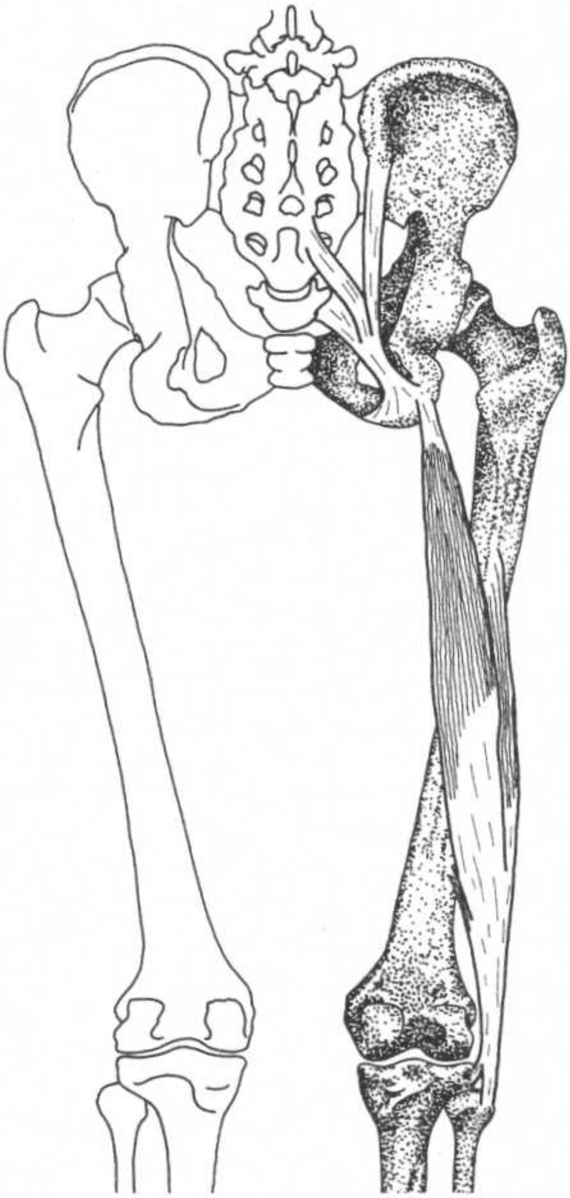
1. Tensor fasciae latae
2. Iliotibial tract
3. Vastus lateralis (quadriceps femoris)
4. Vastus intermedius (quadriceps femoris)
5. Rectus femoris (cut) (quadriceps femoris)
6. Sartorius
7. Vastus medialis (quadriceps femoris)



**Hip and thigh—anterior view**

# BICEPS FEMORIS

*(Part of hamstrings)*



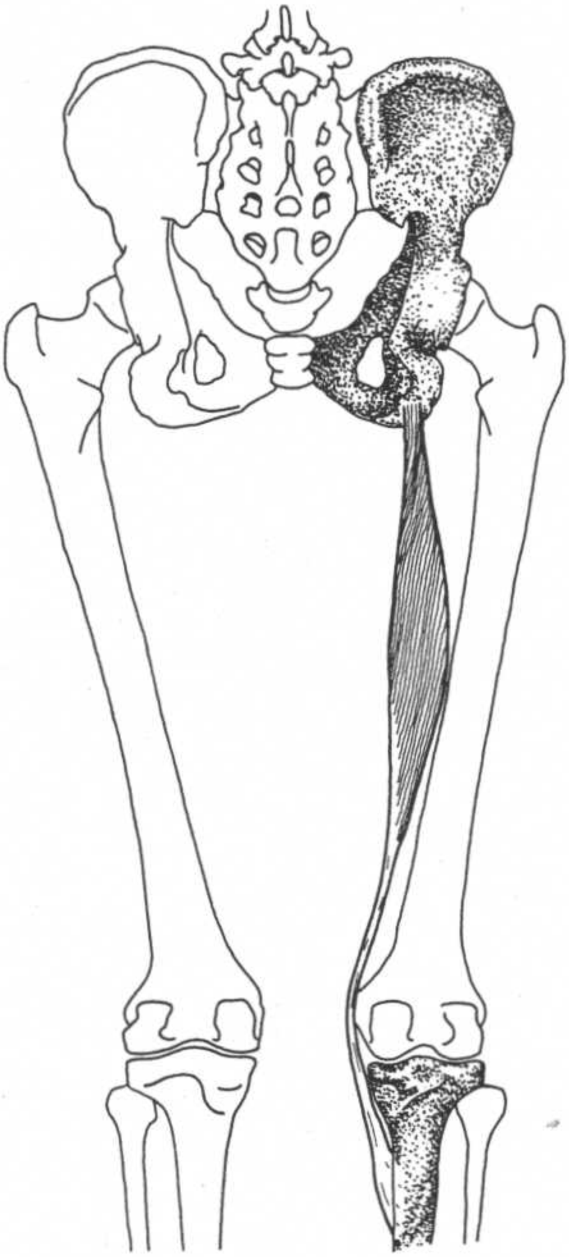
**Hip and thigh—posterior view**

| | |
|---|---|
| **Origin** | Long head—ischial tuberosity, sacrotuberous ligament<br>Short head—linea aspera, lateral supracondylar ridge, lateral intermuscular septum |
| **Insertion** | Lateral side of head of fibula and lateral condyle of tibia |
| **Action** | Flexes leg at knee joint, long head also extends thigh at hip joint |
| **Nerve** | Long head—tibial part of sciatic nerve (S1–S3)<br>Short head—common peroneal part of sciatic nerve (L5, S1, S2) |

Note: During walking or running, the hamstrings are used to slow down the leg at the end of its swing and prevent the trunk from flexing at the hip. They are susceptible to being strained by resisting the momentum of these body parts.

# SEMITENDINOSUS

*(Part of hamstrings)*



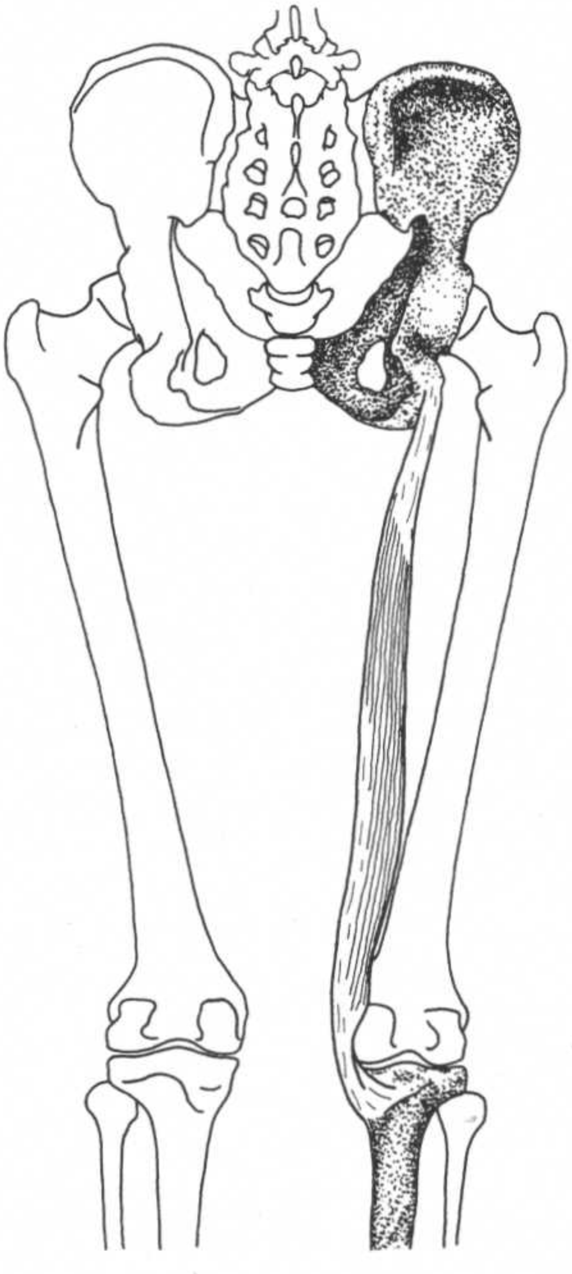
**Hip and thigh—posterior view**

| | |
|---|---|
| **Origin** | Ischial tuberosity |
| **Insertion** | Medial surface of shaft of tibia |
| **Action** | Flexes and slightly medially rotates leg at knee joint after flexion, extends thigh at hip joint |
| **Nerve** | Tibial portion of sciatic nerve (L5, S1, S2) |

Note: See note on biceps femoris and Relationships section on sartorius.

# SEMIMEMBRANOSUS

*(Part of hamstrings)*



**Hip and thigh—posterior view**

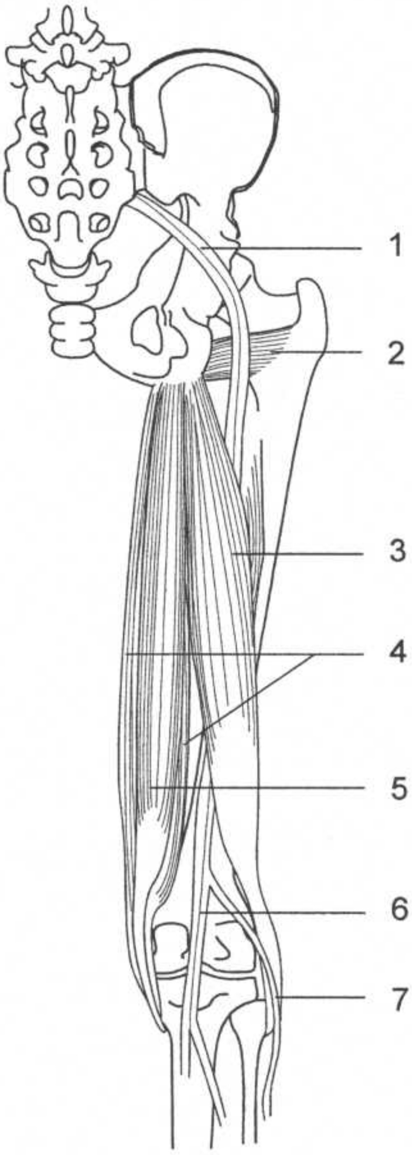
| | |
|---|---|
| **Origin** | Ischial tuberosity |
| **Insertion** | Posterior part of medial condyle of tibia |
| **Action** | Flexes and slightly medially rotates leg at knee joint after flexion, extends thigh at hip joint |
| **Nerve** | Tibial portion of sciatic nerve (L5, S1, S2) |

Note: See note on biceps femoris.

# HAMSTRING MUSCLES

1. Sciatic nerve
2. Quadratus femoris
3. Biceps femoris
4. Semimembranosus
5. Semitendinosus
6. Tibial nerve
7. Common peroneal nerve

Note: The common peroneal nerve is exposed to compression and damage as it passes over the head of the fibula. The quadratus femoris, a lateral rotator, is included for reference.

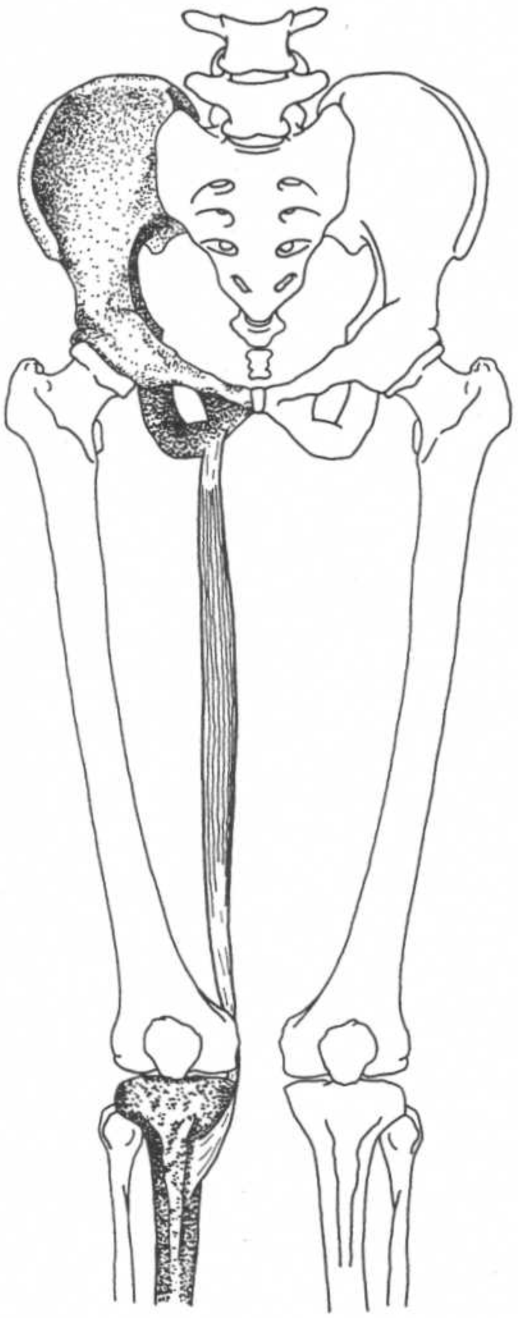


**Hip and thigh—posterior view**

# GRACILIS

| | |
|---|---|
| **Origin** | Lower margin of body and inferior ramus of pubis |
| **Insertion** | Upper part of medial surface of shaft of tibia |
| **Action** | Adducts thigh at hip joint and flexes leg at knee joint; with leg flexed, assists in medial rotation |
| **Nerve** | Obturator nerve (L3, L4) |

Note: See Relationships section on sartorius.

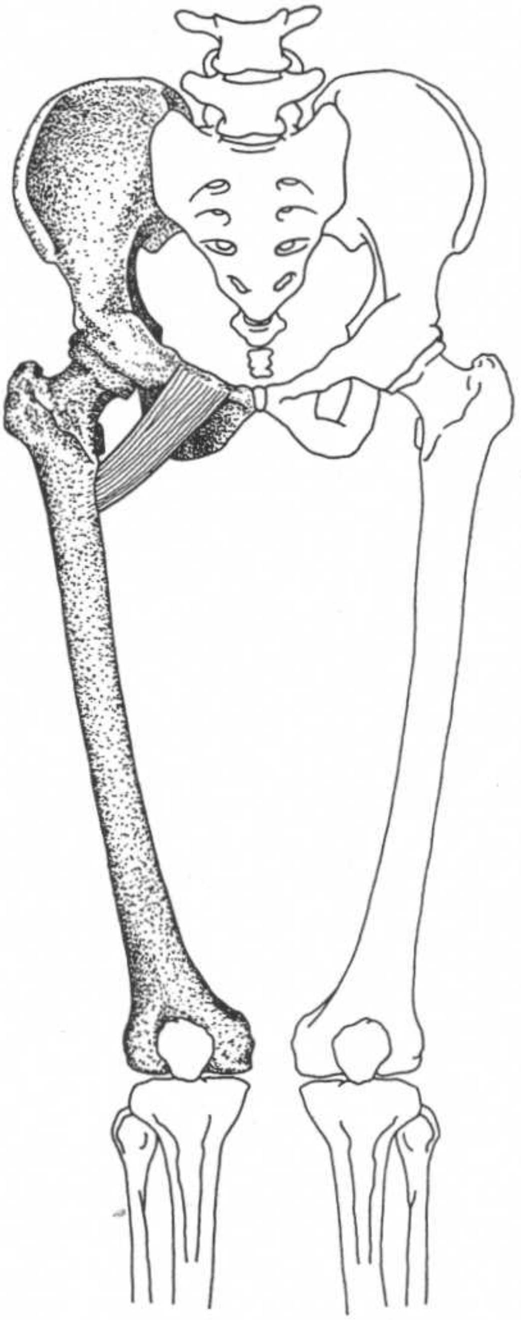


**Hip and thigh—anterior view**

# PECTINEUS

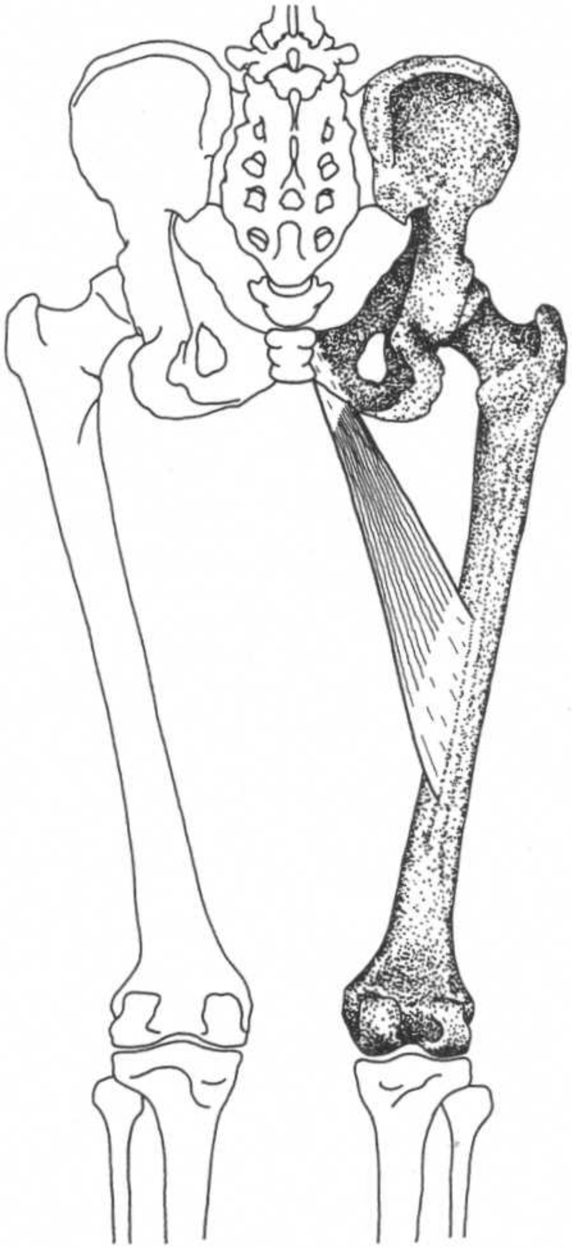
| | |
|---|---|
| **Origin** | Pectineal line on superior ramus of pubis |
| **Insertion** | From lesser trochanter to linea aspera of femur |
| **Action** | Flexes thigh, assists in adduction when hip is flexed |
| **Nerve** | Femoral nerve (L2–L4), (sometimes a branch of obturator nerve) |

Note: The rotating function of this and other hip muscles is controversial and probably depends on whether the hip is flexed or extended and adducted or abducted.



**Hip and thigh—anterior view**

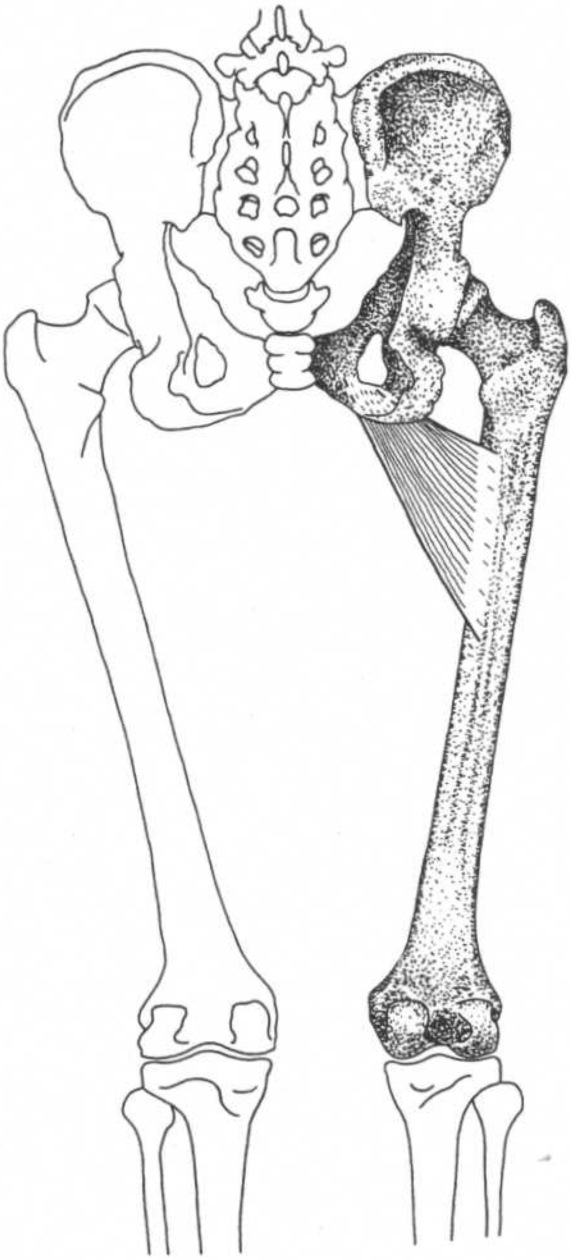
# ADDUCTOR LONGUS



Hip and thigh—posterior view

| | | | |
|---|---|---|---|
| **Origin** | Anterior of body of pubis | **Action** | Adducts, flexes thigh, assists in medial rotation |
| **Insertion** | Medial lip of linea aspera | **Nerve** | Obturator nerve (L3, L4) |

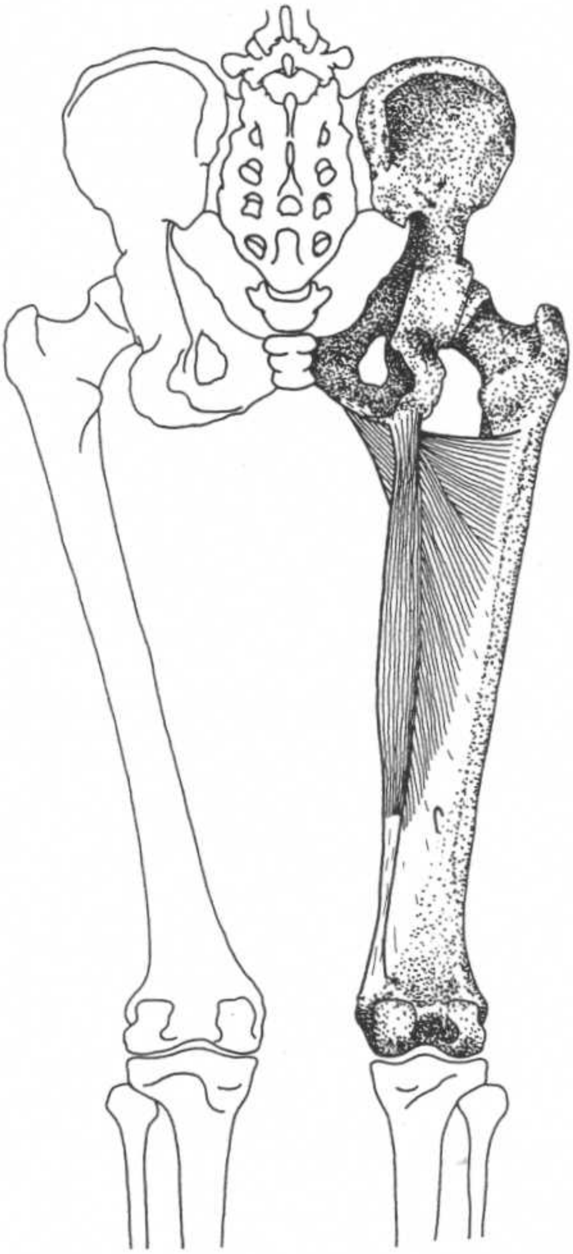
# ADDUCTOR BREVIS



**Hip and thigh—posterior view**

| | | | |
|---|---|---|---|
| **Origin** | Outer surface of inferior ramus of pubis | **Action** | Adducts thigh, assists in flexion, medial rotation |
| **Insertion** | From below lesser trochanter to linea aspera and into proximal part of linea aspera | **Nerve** | Obturator nerve (L3, L4) |

# ADDUCTOR MAGNUS



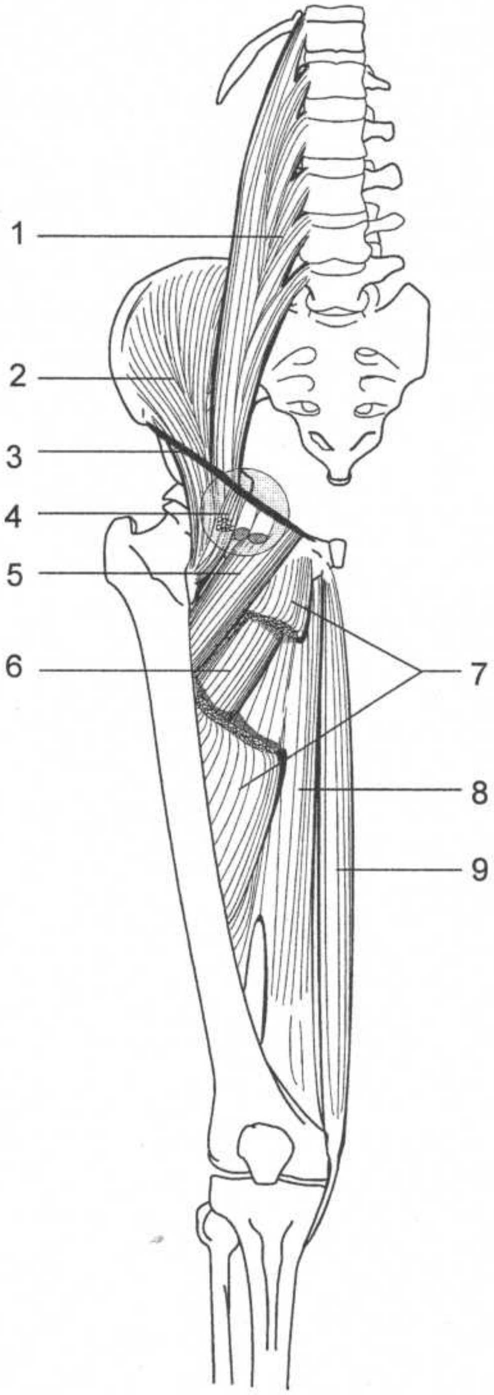
## Hip and thigh—posterior view

| | | | |
|---|---|---|---|
| **Origin** | Inferior ramus of pubis, and ramus and lower part of tuberosity of ischium | **Action** | Adducts, extends thigh, lower portion (adductor tubercle insertion) assists in medial rotation |
| **Insertion** | Linea aspera, adductor tubercle of femur | **Nerve** | Obturator nerve (L3, L4), sciatic nerve |

Note: The linea aspera insertion may assist in lateral rotation.

# HIP FLEXORS AND ADDUCTORS

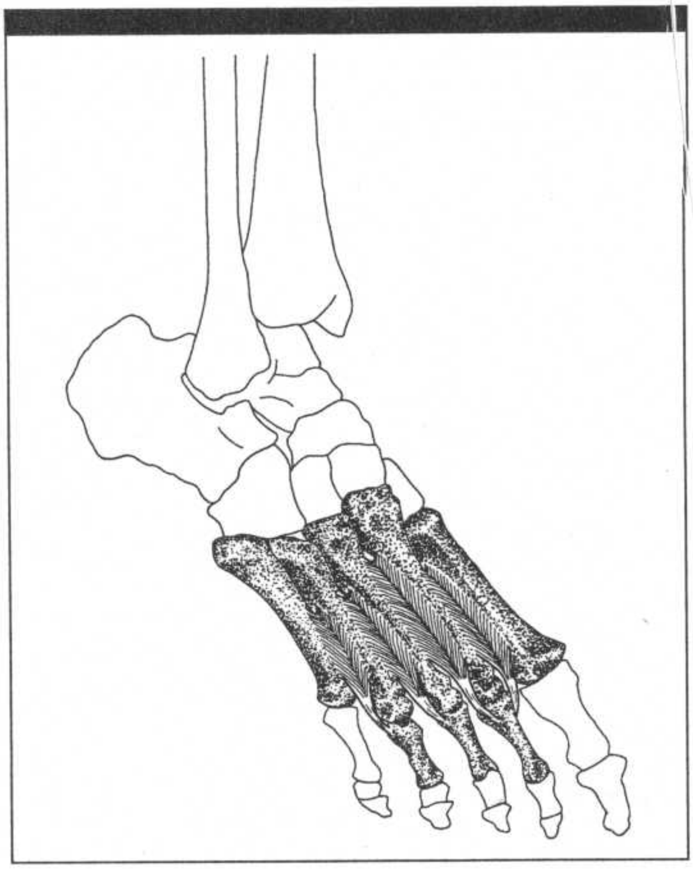
Psoas major
Iliacus
Inguinal ligament
Femoral nerve, vein, artery
Pectineus
Adductor brevis
Adductor longus (cut)
Adductor magnus
Gracilis



Hip and thigh—anterior view

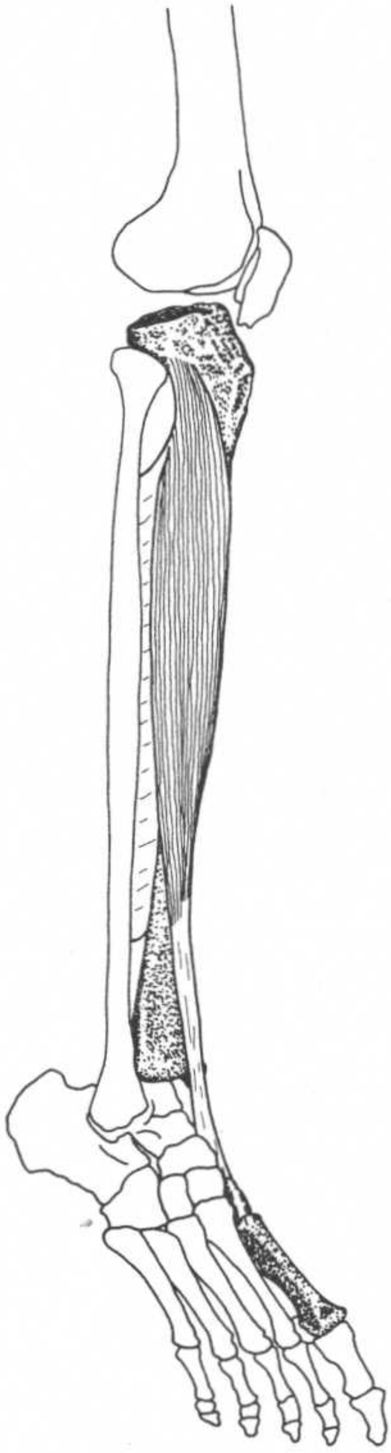
## CHAPTER NINE

# MUSCLES OF THE LEG AND FOOT



# TIBIALIS ANTERIOR

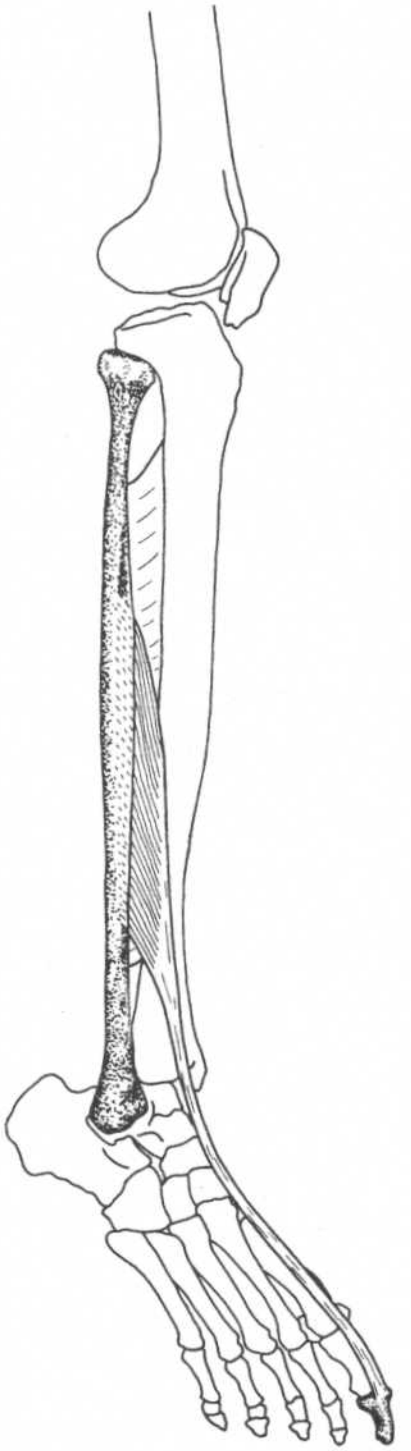
| | |
|---|---|
| **Origin** | Lateral condyle of tibia, upper half of lateral surface of tibia, interosseous membrane |
| **Insertion** | Medial side and plantar surface of medial cuneiform bone, and base of first metatarsal bone |
| **Action** | Dorsiflexes foot at ankle joint, inverts (supinates) foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

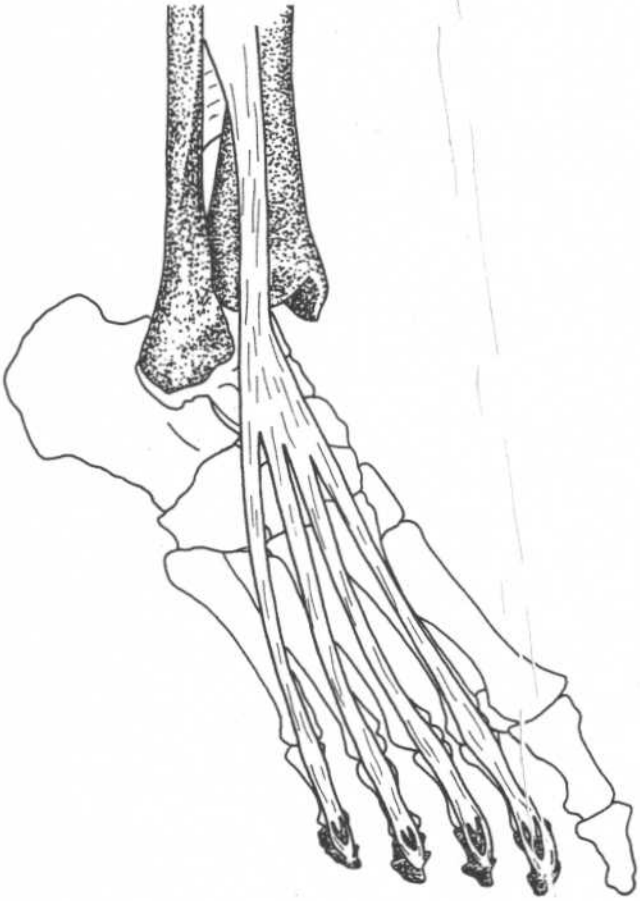
# EXTENSOR HALLUCIS LONGUS

| | |
|---|---|
| **Origin** | Middle half of anterior surface of fibula and interosseous membrane |
| **Insertion** | Base of distal phalanx of great toe |
| **Action** | Extends, hyperextends great toe, dorsiflexes and inverts (supinates) foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

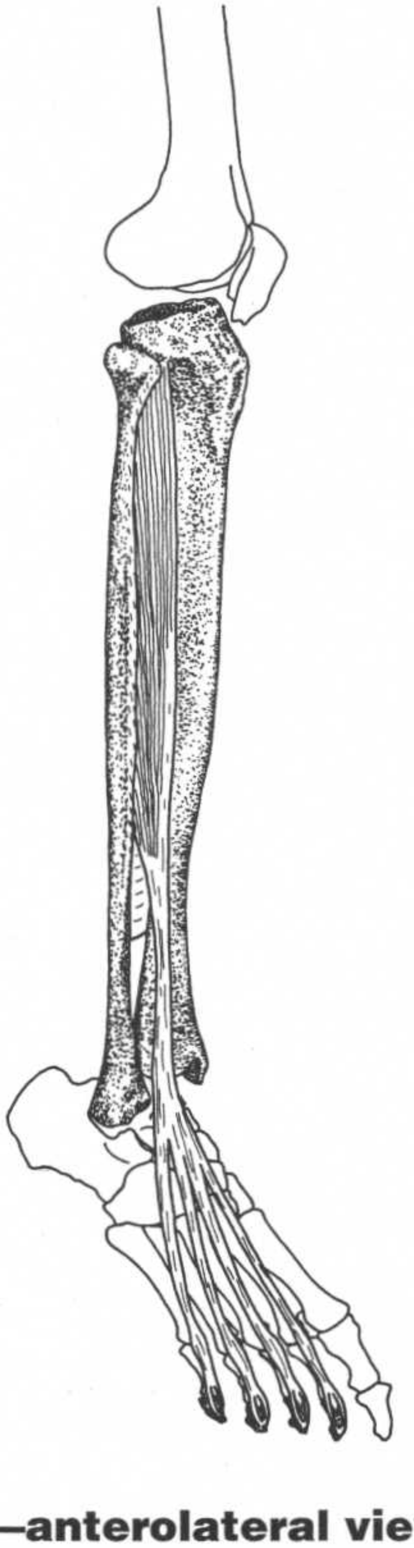
# EXTENSOR DIGITORUM LONGUS



**Foot—anterolateral view**

| | |
|---|---|
| **Origin** | Upper two-thirds of anterior surface of fibula, interosseous membrane, lateral condyle of tibia |
| **Insertion** | Along dorsal surface of four lateral toes, and then to bases of middle and distal phalanges |
| **Action** | Extends toes, dorsiflexes foot at ankle, everts foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |

Note: The lower lateral part of this muscle makes a separate insertion onto the dorsal surface of the fifth metatarsal and is called *peroneus tertius.*

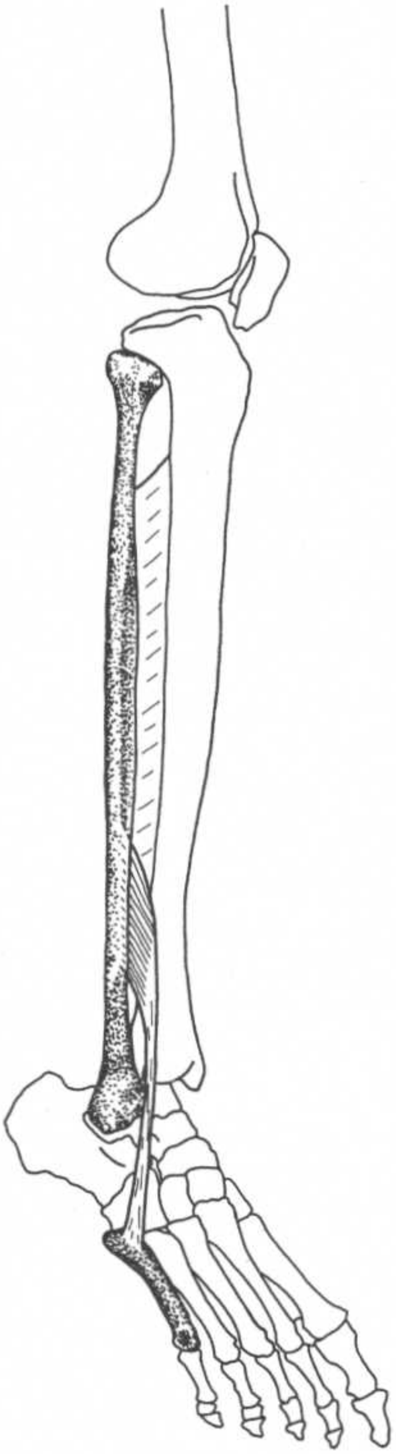


**Leg—anterolateral view**

# PERONEUS TERTIUS

*(Lower lateral part of extensor digitorum longus)*

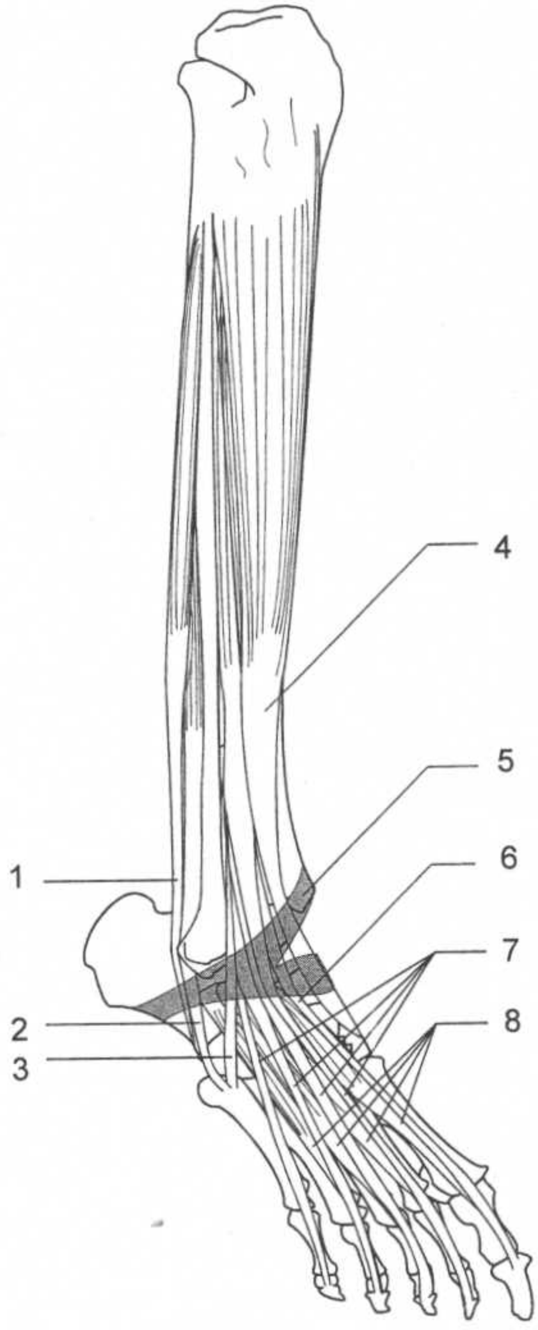
| | |
|---|---|
| **Origin** | Lower third of anterior surface of fibula and interosseous membrane |
| **Insertion** | Dorsal surface of base of fifth metatarsal bone |
| **Action** | Dorsiflexes and everts foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

# ANTERIOR AND LATERAL LEG MUSCLES

1. Peroneus longus
2. Peroneus brevis
3. Peroneus tertius
4. Tibialis anterior
5. Extensor retinaculum
6. Extensor hallucis longus
7. Extensor digitorum longus
8. Extensor digitorum brevis

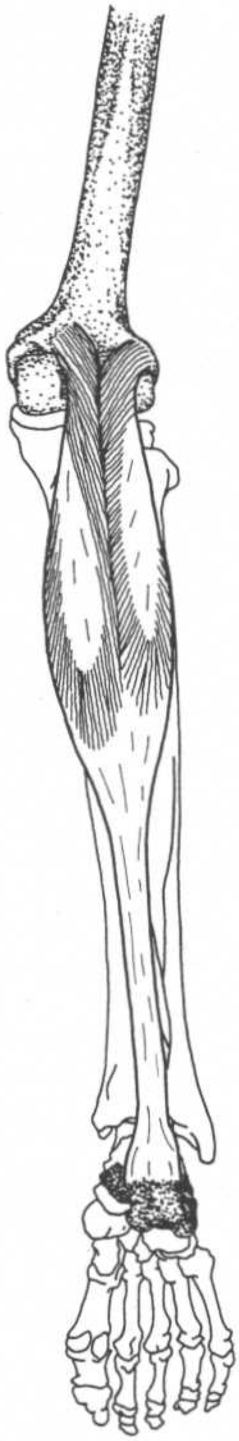


**Leg—anterolateral view**

# GASTROCNEMIUS

*(Part of triceps surae)*

| | |
|---|---|
| **Origin** | Lateral head—lateral condyle and posterior surface of femur<br>Medial head—popliteal surface of femur above medial condyle |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot, flexes leg at knee |
| **Nerve** | Tibial nerve (S1, S2) |

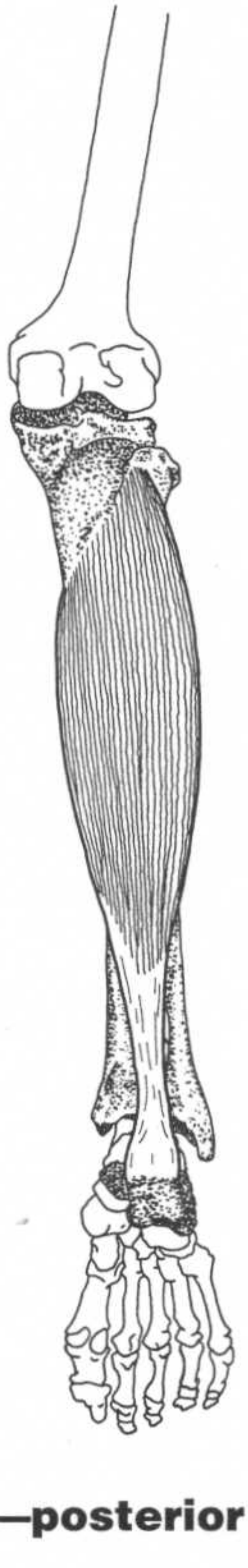


**Leg—posterior view**

# SOLEUS

*(Part of triceps surae)*

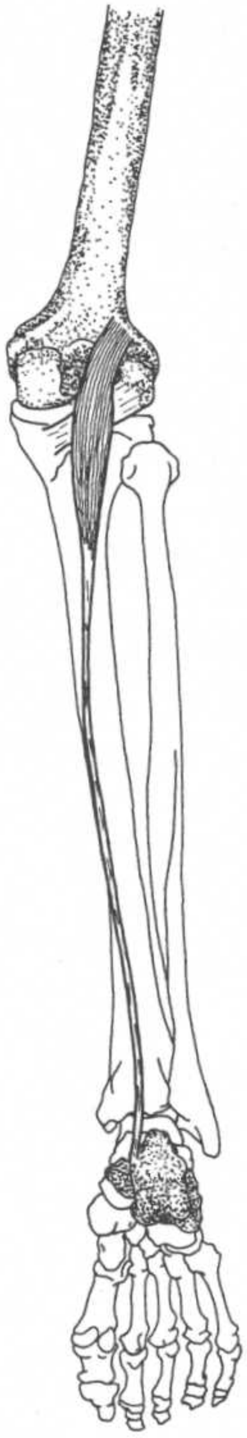
| | |
|---|---|
| **Origin** | Posterior surface of the tibia (soleal line), upper third of posterior surface of fibula, fibrous arch between tibia and fibula |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot |
| **Nerve** | Tibial nerve (S1, S2) |



**Leg—posterior view**

# PLANTARIS

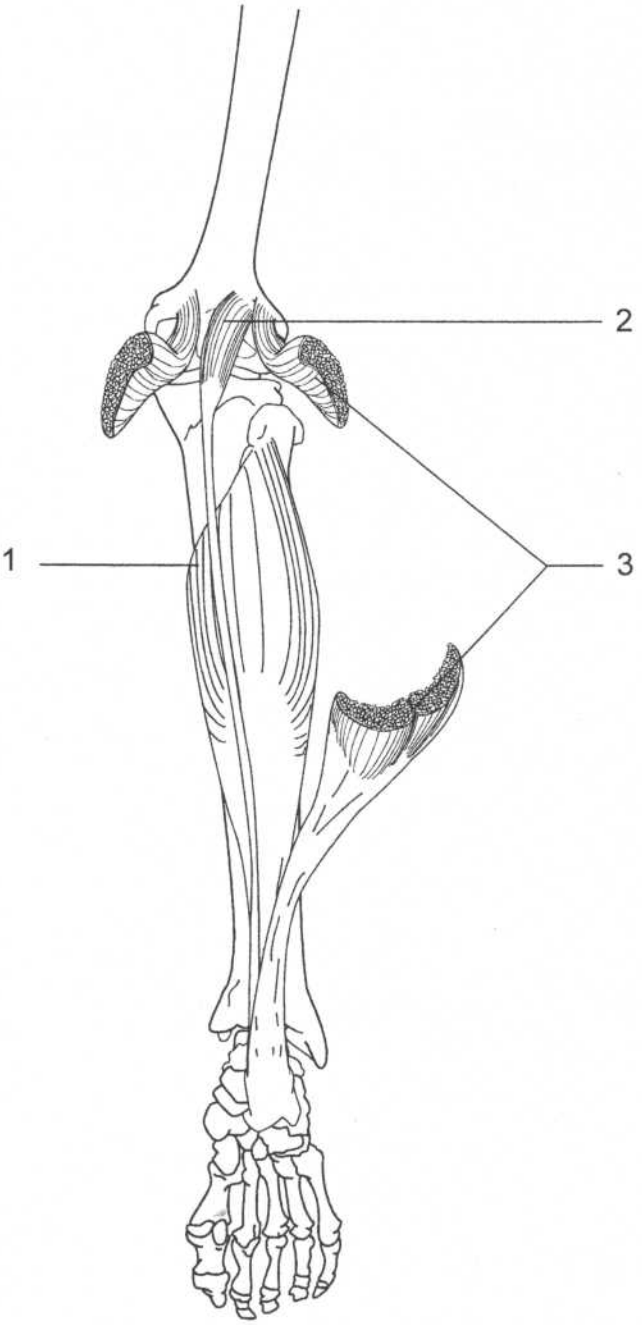
| | |
|---|---|
| **Origin** | Lateral supracondylar ridge of femur, oblique popliteal ligament |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot, flexes leg |
| **Nerve** | Tibial nerve (L4, L5, S1) |



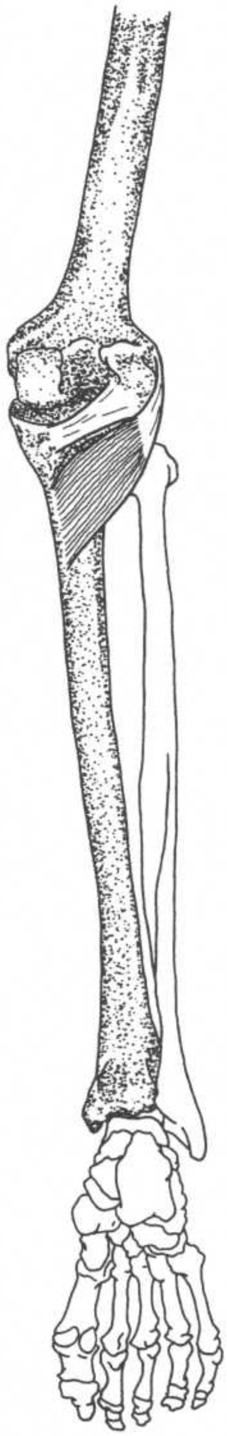
**Leg—posterior view**

# MUSCLES OF THE CALF

1. Soleus
2. Plantaris
3. Gastrocnemius (cut)



**Leg—posterior view**



## Leg—posterior view

# POPLITEUS

| | |
|---|---|
| **Origin** | Lateral surface of lateral condyle of femur |
| **Insertion** | Upper part of posterior surface of tibia |
| **Action** | Rotates leg medially, flexes leg |
| **Nerve** | Tibial nerve (L4, L5, S1) |

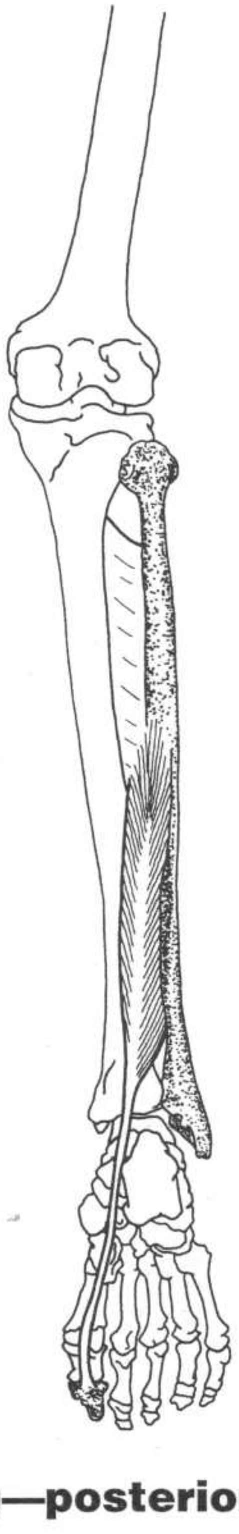
Note: Stern contends that this muscle stabilizes the knee by preventing lateral rotation of the tibia during medial rotation of the thigh while the foot is planted.

Reference:
Stern, JT: *Essentials of Gross Anatomy,* F. A. Davis Company, Philadelphia, 1988.

# FLEXOR HALLUCIS LONGUS

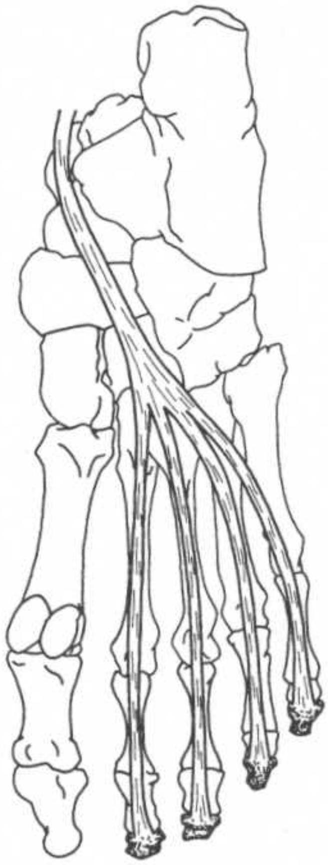
| | |
|---|---|
| **Origin** | Lower two-thirds of posterior surface of shaft of fibula, posterior intermuscular septum, interosseous membrane |
| **Insertion** | Base of distal phalanx of great toe |
| **Action** | Flexes distal phalanx of great toe, assists in plantar flexing foot, inverts foot |
| **Nerve** | Tibial nerve (L5, S1, S2) |

Note: This muscle is important in pushing off the surface in walking, running, jumping.



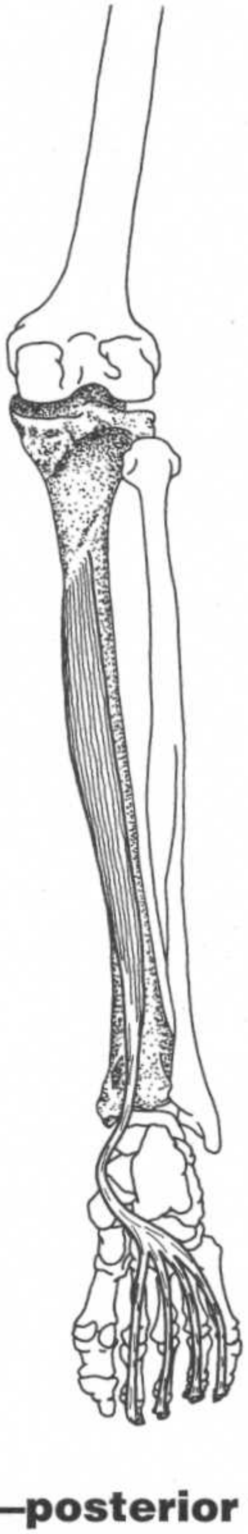
**Leg—posterior view**

# FLEXOR DIGITORUM LONGUS



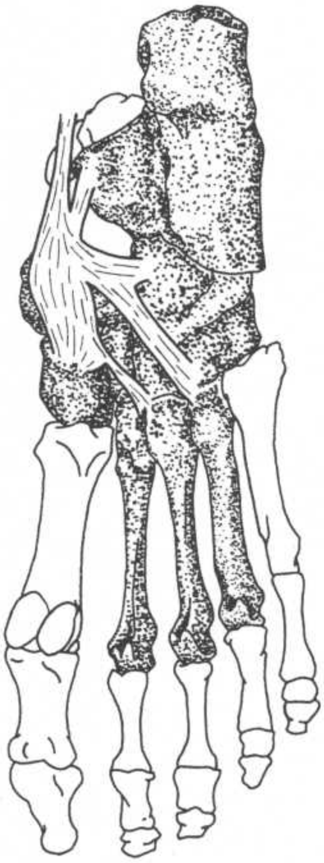
Foot—plantar view

| | |
|---|---|
| **Origin** | Medial part of posterior surface of tibia |
| **Insertion** | Bases of distal phalanges of second, third, fourth, and fifth toes |
| **Action** | Flexes distal phalanges of lateral four toes, assists in plantar flexing foot, inverts foot |
| **Nerve** | Tibial nerve (L5, S1) |



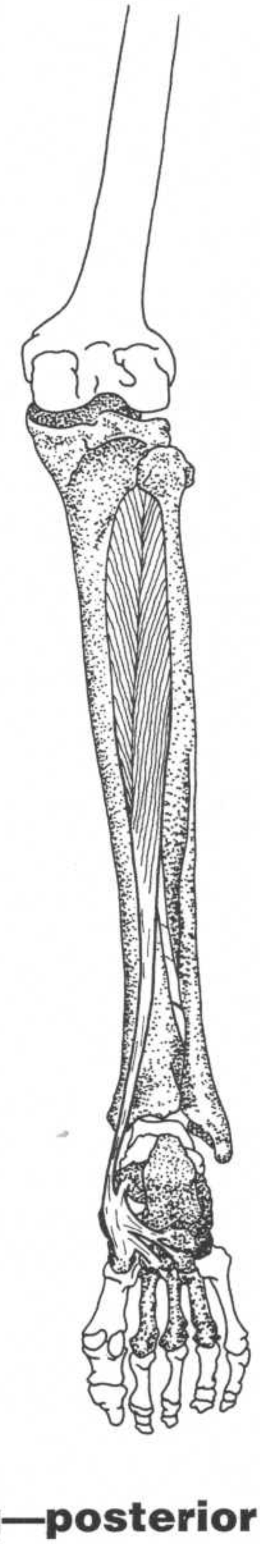
Leg—posterior view

# TIBIALIS POSTERIOR



**Foot—plantar view**

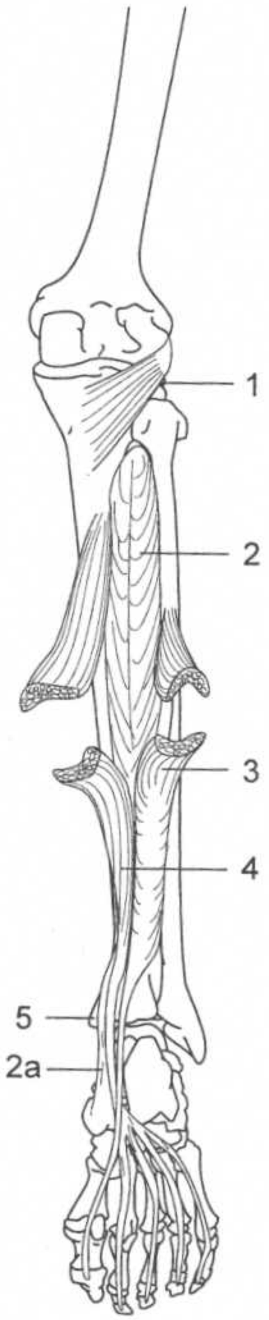
| | |
|---|---|
| **rigin** | Lateral part of posterior surface of tibia, interosseous membrane, proximal half of posterior surface of fibula |
| **nsertion** | Tuberosity of navicular bone, cuboid, cuneiforms, second, third, and fourth metatarsals, sustentaculum tali of calcaneus |
| **ction** | Plantar flexes, inverts foot |
| **erve** | Tibial nerve (L5, S1) |



**Leg—posterior view**

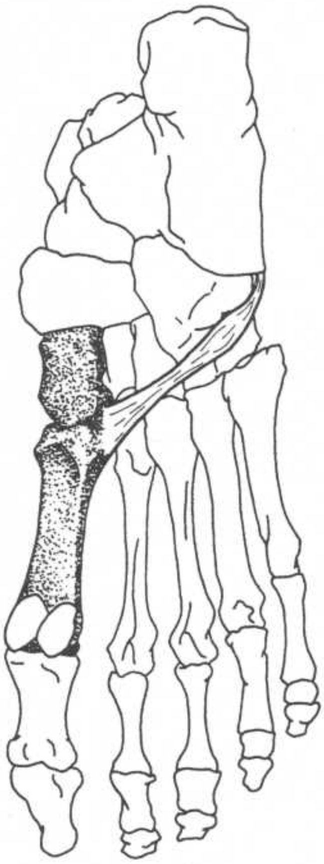
# DEEP POSTERIOR LEG MUSCLES

**1.** Popliteus
**2.** Tibialis posterior
**2a.** Tendon of tibialis posterior
**3.** Flexor hallucis longus (cut)
**4.** Flexor digitorum longus (cut)
**5.** Medial malleolus



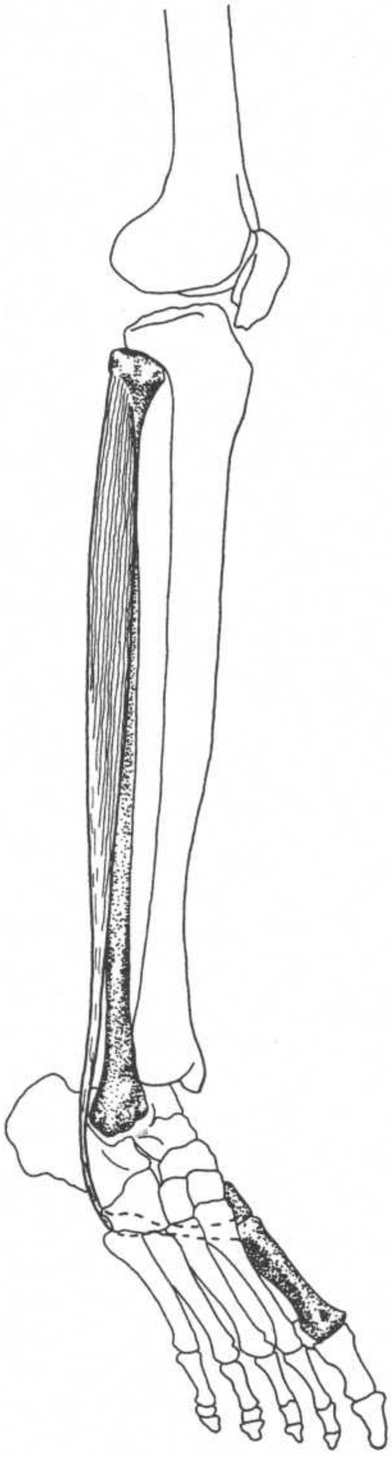
**Leg—posterior view**

# PERONEUS LONGUS



**Foot—plantar view**

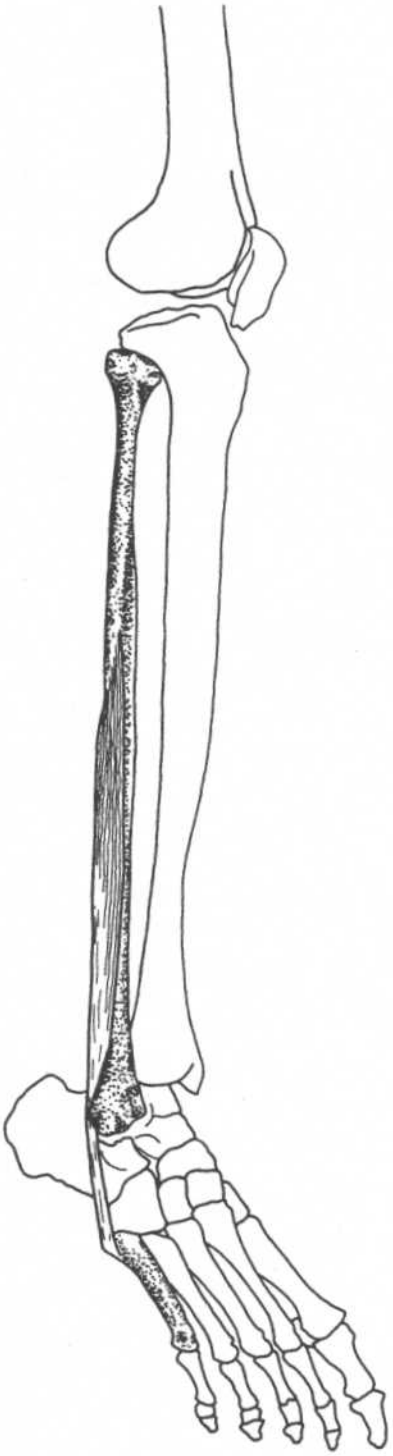
| | |
|---|---|
| **igin** | Upper two-thirds of lateral surface of fibula |
| **sertion** | Lateral side of medial cuneiform, base of first metatarsal |
| **tion** | Plantar flexes, everts foot |
| **rve** | Superficial peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

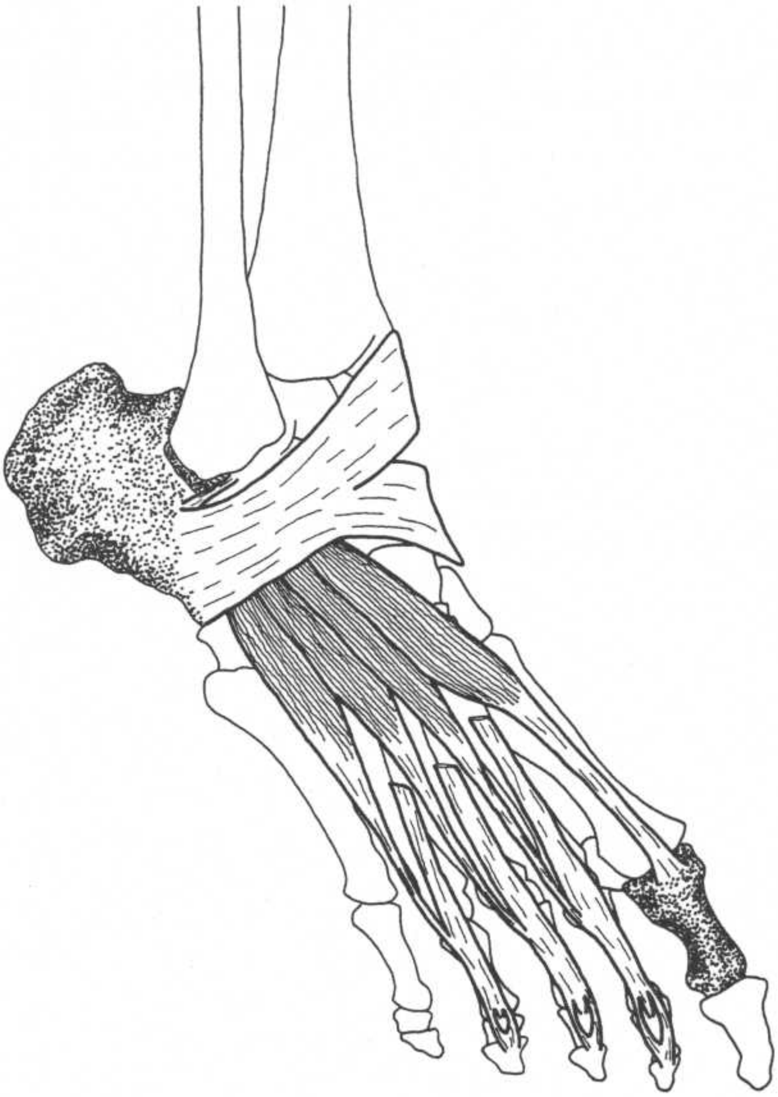
# PERONEUS BREVIS

| | |
|---|---|
| **Origin** | Lower two-thirds of lateral surface of fibula |
| **Insertion** | Lateral side of base of fifth metatarsal bone |
| **Action** | Everts, plantar flexes foot |
| **Nerve** | Superficial peroneal nerve (L4, L5, S1) |



Leg—anterolateral view

# EXTENSOR DIGITORUM BREVIS

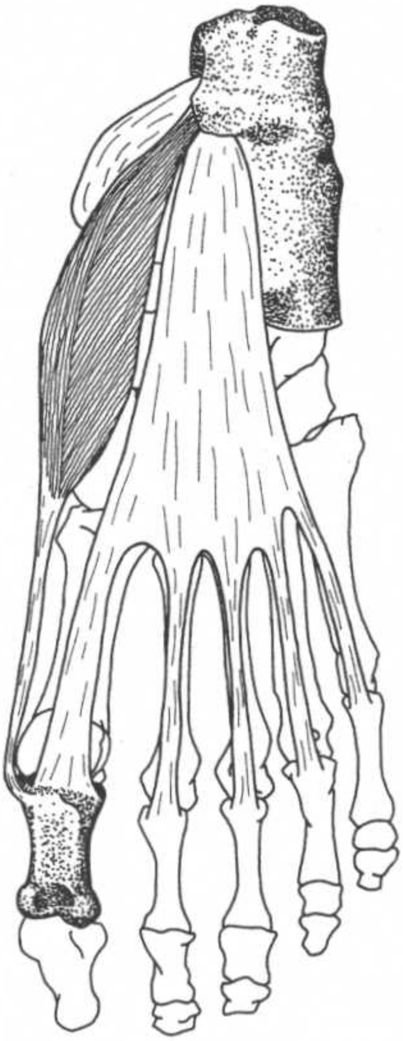


## Foot—anterolateral view

| | | | |
|---|---|---|---|
| **Origin** | Anterior and lateral surfaces of calcaneus, lateral talocalcaneal ligament, inferior extensor retinaculum | **Action** | Extends the four toes |
| **Insertion** | Into base of proximal phalanx of great toe, into lateral sides of tendons of extensor digitorum longus of second, third, and fourth toes | **Nerve** | Deep peroneal nerve (L5, S1) |

# ABDUCTOR HALLUCIS

*(First layer)*



**Foot—plantar view**

| | |
|---|---|
| **Origin** | Tuberosity of calcaneus, flexor retinaculum, plantar aponeurosis |
| **Insertion** | Medial side of base of proximal phalanx of great toe |
| **Action** | Abducts great toe |
| **Nerve** | Medial plantar nerve (L4, L5) |

Note: The muscles of the sole of the foot can be divided into four layers (from superficial to deep):

First layer—abductor hallucis, flexor digitorum brevis, abductor digiti minimi

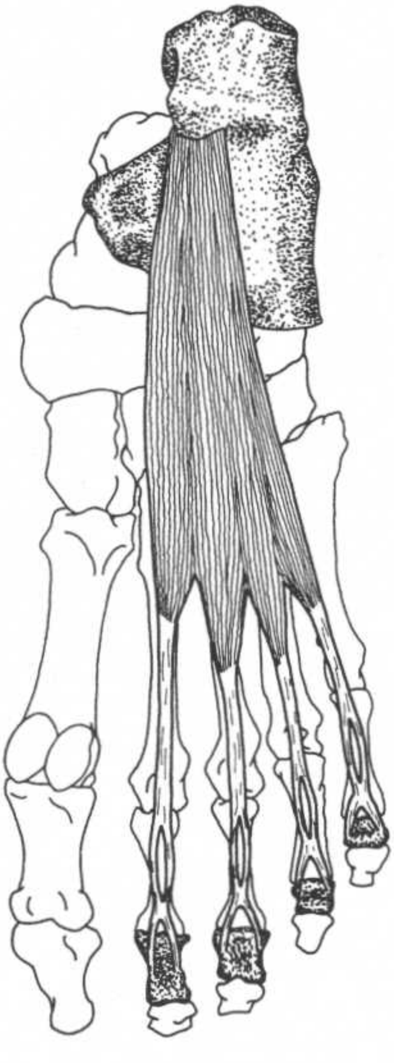
Second layer—quadratus plantae, lumbricales (tendons of flexor hallucis longus and flexor digitorum longus pass through this layer)

Third layer—flexor hallucis brevis, adductor hallucis, flexor digiti minimi brevis

Fourth layer—interossei (tendons of tibialis posterior and peroneus longus pass through this layer)

# FLEXOR DIGITORUM BREVIS

*(First layer)*

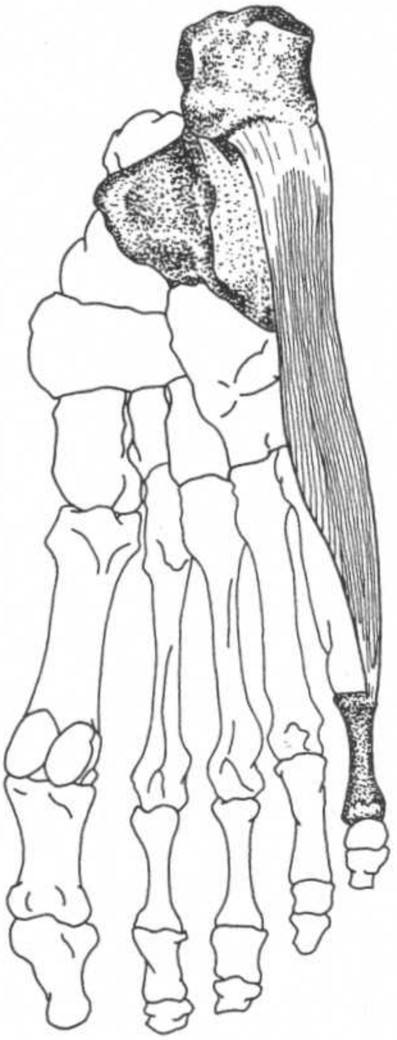


## Foot—plantar view

| | | | |
|---|---|---|---|
| **rigin** | Tuberosity of calcaneus, plantar aponeurosis | **Action** | Flexes proximal phalanges and extends distal phalanges of second through fifth toes |
| **sertion** | Sides of middle phalanges of second to fifth toes | **Nerve** | Medial plantar nerve (L4, L5) |

# ABDUCTOR DIGITI MINIMI

*(First layer)*

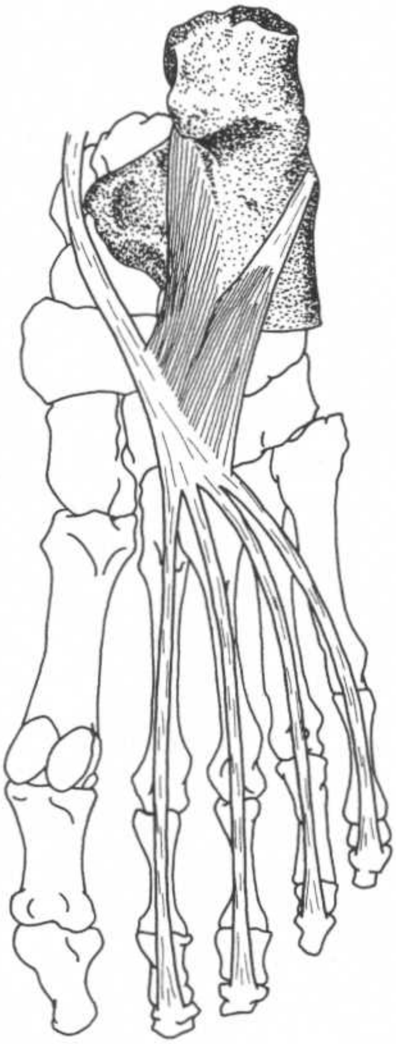


**Foot—plantar view**

| | |
|---|---|
| **Origin** | Tuberosity of calcaneus, plantar aponeurosis |
| **Insertion** | Lateral side of proximal phalanx of fifth toe |
| **Action** | Abducts fifth toe |
| **Nerve** | Lateral plantar nerve (S1, S2) |

# QUADRATUS PLANTAE

*(Second layer)*

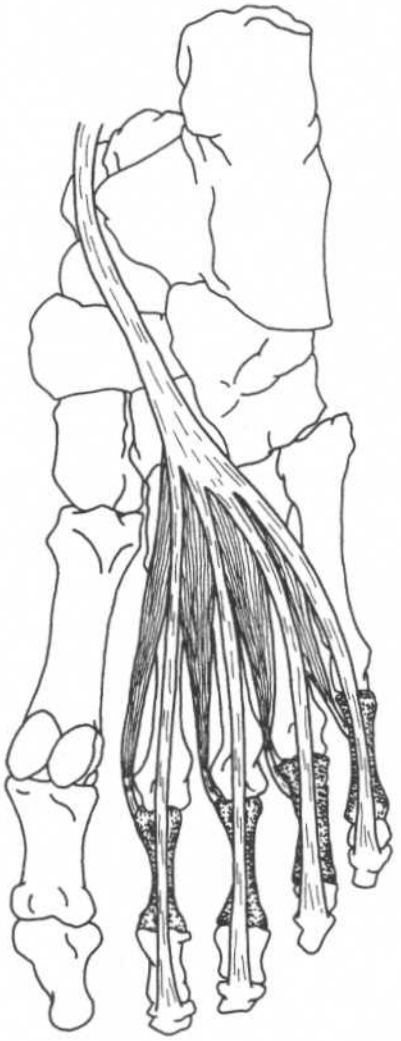


## Foot—plantar view

| | |
|---|---|
| **rigin** | Medial head—medial surface of calcaneus |
| | Lateral head—lateral border of inferior surface of calcaneus |
| **sertion** | Lateral margin of tendon of flexor digitorum longus |
| **Action** | Flexes terminal phalanges of second through fifth toes |
| **Nerve** | Lateral plantar nerve (S1, S2) |

# LUMBRICALES

*(Second layer)*

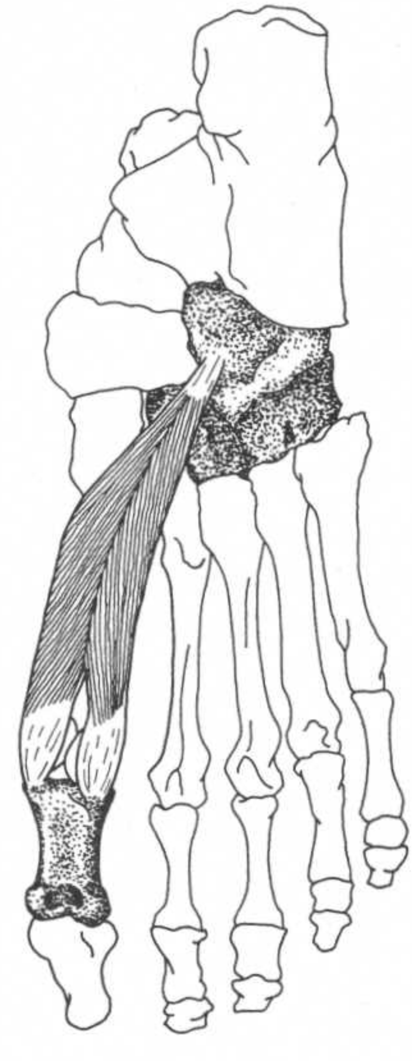


**Foot—plantar view**

| | |
|---|---|
| **Origin** | Tendons of flexor digitorum longus |
| **Insertion** | Dorsal surfaces of proximal phalanges |
| **Action** | Flex proximal phalanges of second through fifth toes |
| **Nerve** | First lumbricalis—medial plantar nerve (L4, L5)<br>Second through fifth lumbricales—lateral plantar nerve (S1, S2) |

# FLEXOR HALLUCIS BREVIS

*(Third layer)*

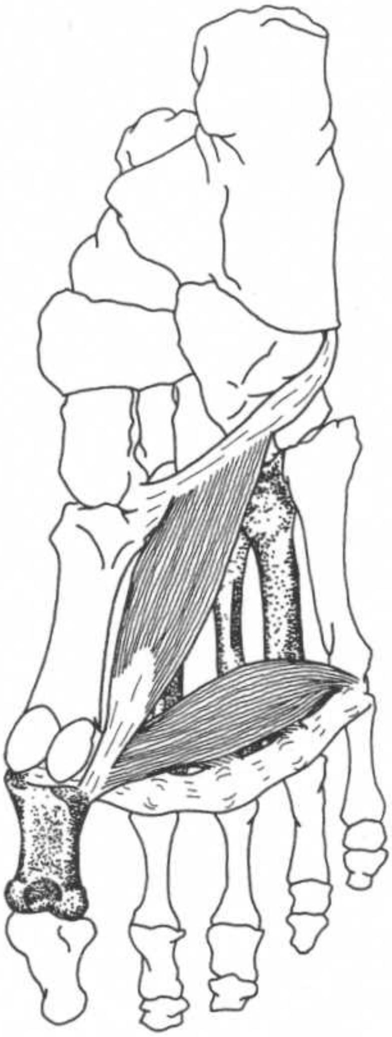


## Foot—plantar view

| | | | |
|---|---|---|---|
| **rigin** | Cuboid bone, lateral cuneiform bone | **Action** | Flexes proximal phalanx of great toe |
| **nsertion** | Medial part—medial side of base of proximal phalanx of great toe<br>Lateral part—lateral side of base of proximal phalanx of great toe | **Nerve** | Medial plantar nerve (L4, L5, S1) |

# ADDUCTOR HALLUCIS

*(Third layer)*

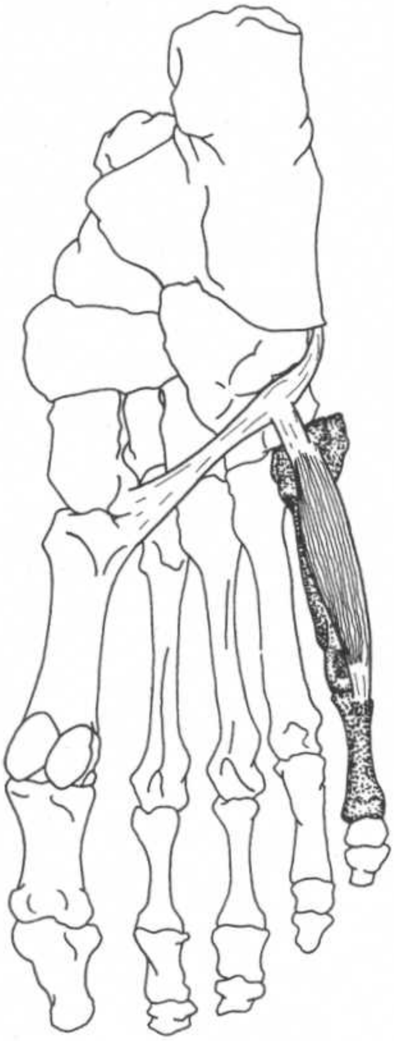


**Foot—plantar view**

| | |
|---|---|
| **Origin** | Oblique head—second, third, and fourth metatarsal bones, and sheath of peroneus longus tendon<br>Transverse head—plantar metatarsophalangeal ligaments of third, fourth, and fifth toes, and transverse metatarsal ligaments |
| **Insertion** | Lateral side of base of proximal phalanx of great toe |
| **Action** | Adducts great toe |
| **Nerve** | Lateral plantar nerve (S1, S2) |

# FLEXOR DIGITI MINIMI BREVIS

*(Third layer)*



## Foot—plantar view

**gin** Base of fifth metatarsal, sheath of peroneus longus tendon

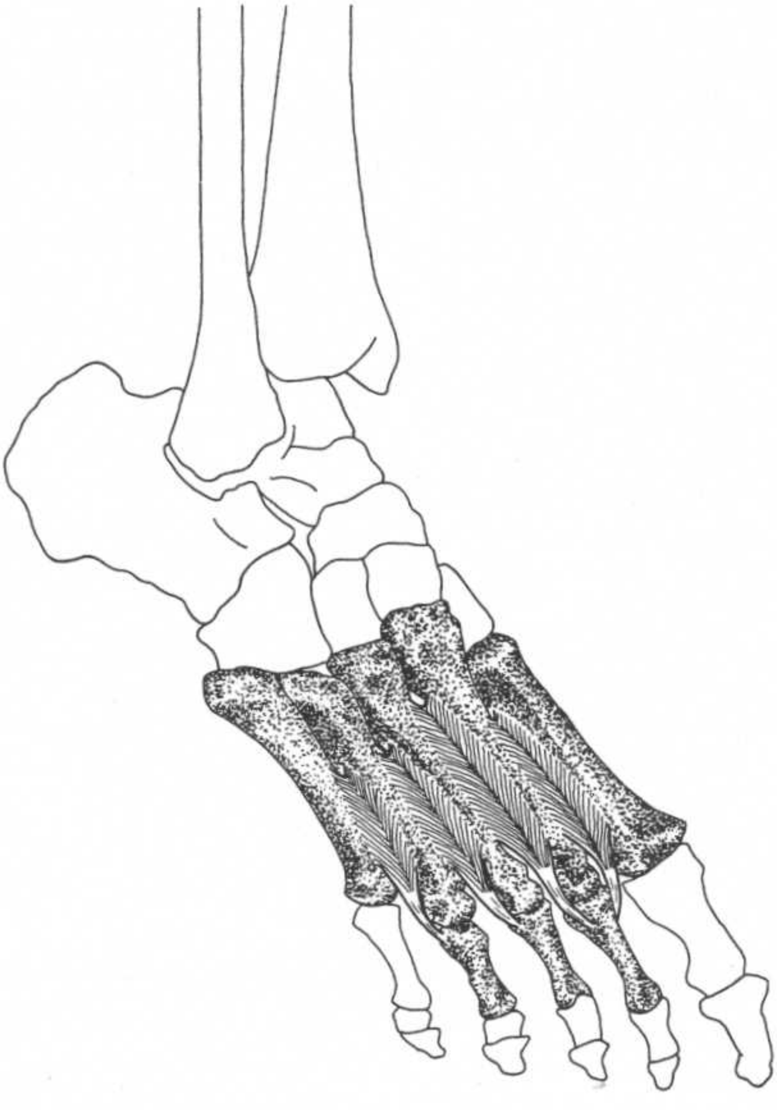
**ertion** Lateral side of base of proximal phalanx of fifth toe

**Action** Flexes proximal phalanx of fifth toe

**Nerve** Lateral plantar nerve (S1, S2)

# DORSAL INTEROSSEI

*(Fourth layer; four muscles)*

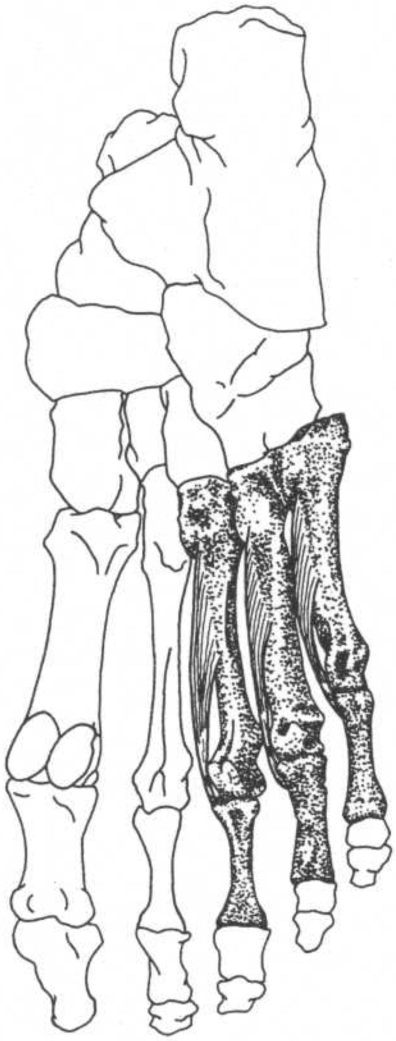


## Foot—anterolateral view

| | | | |
|---|---|---|---|
| **Origin** | Adjacent sides of metatarsal bones | **Action** | Abduct toes, flex proximal phalanges |
| **Insertion** | Bases of proximal phalanges<br>First—medial side of proximal phalanx of second toe<br>Second, third, fourth—lateral sides of proximal phalanges of second, third, and fourth toes | **Nerve** | Lateral plantar nerve (S1, S2) |

# PLANTAR INTEROSSEI

*(Fourth layer; three muscles)*



**Foot—plantar view**

| | |
|---|---|
| **Origin** | Bases and medial sides of third, fourth, and fifth metatarsal bones |
| **Insertion** | Medial sides of bases of proximal phalanges of same toes |
| **Action** | Adduct toes, flex proximal phalanges |
| **Nerve** | Lateral plantar nerve (S1, S2) |

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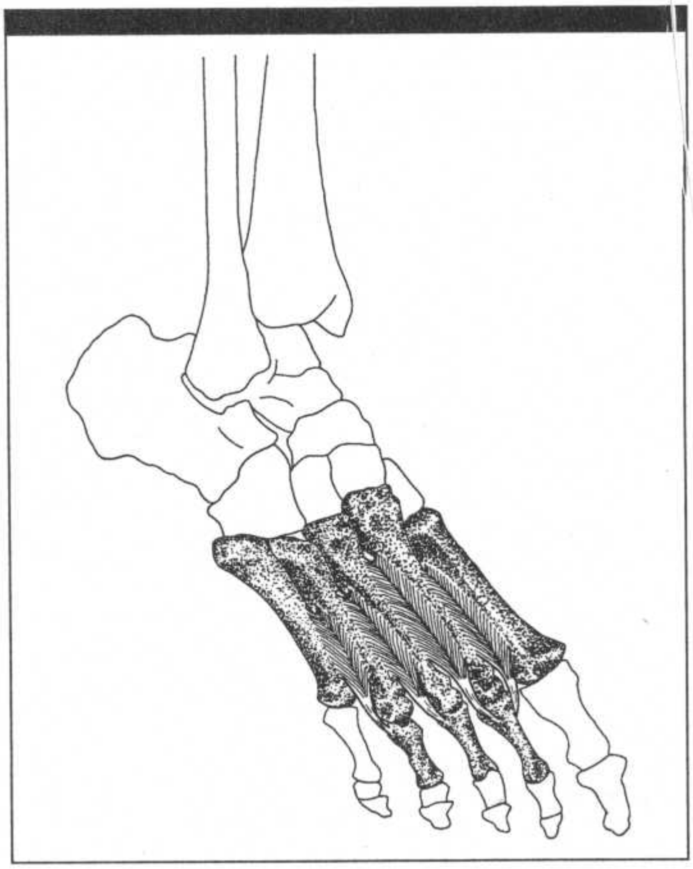
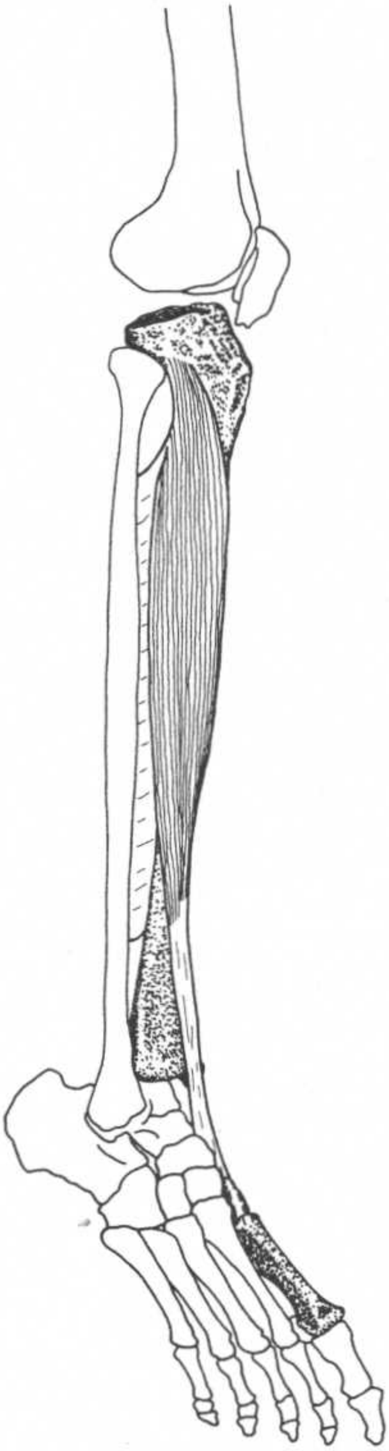
## CHAPTER NINE

# MUSCLES OF THE LEG AND FOOT



# TIBIALIS ANTERIOR

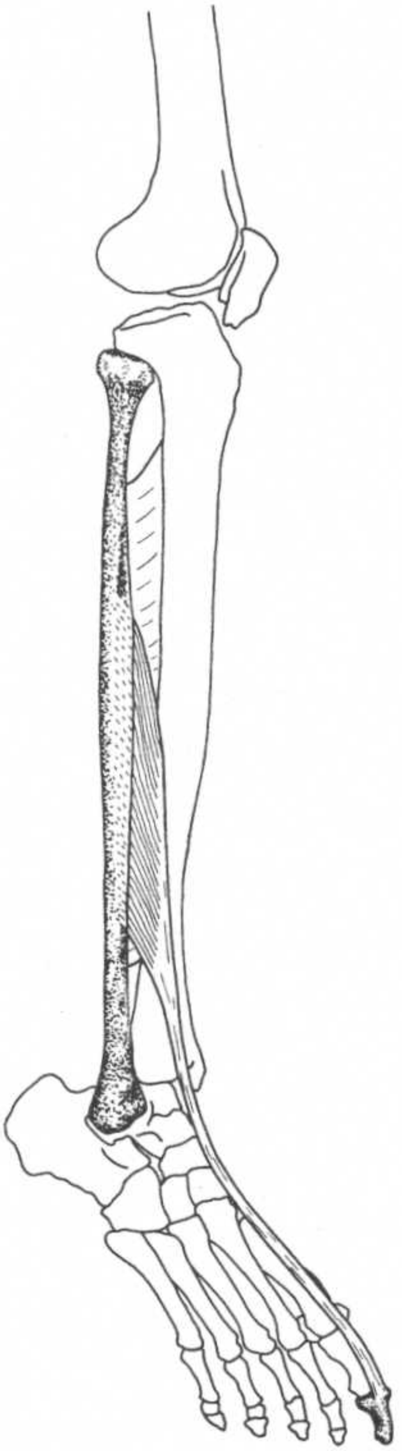
| | |
|---|---|
| **Origin** | Lateral condyle of tibia, upper half of lateral surface of tibia, interosseous membrane |
| **Insertion** | Medial side and plantar surface of medial cuneiform bone, and base of first metatarsal bone |
| **Action** | Dorsiflexes foot at ankle joint, inverts (supinates) foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

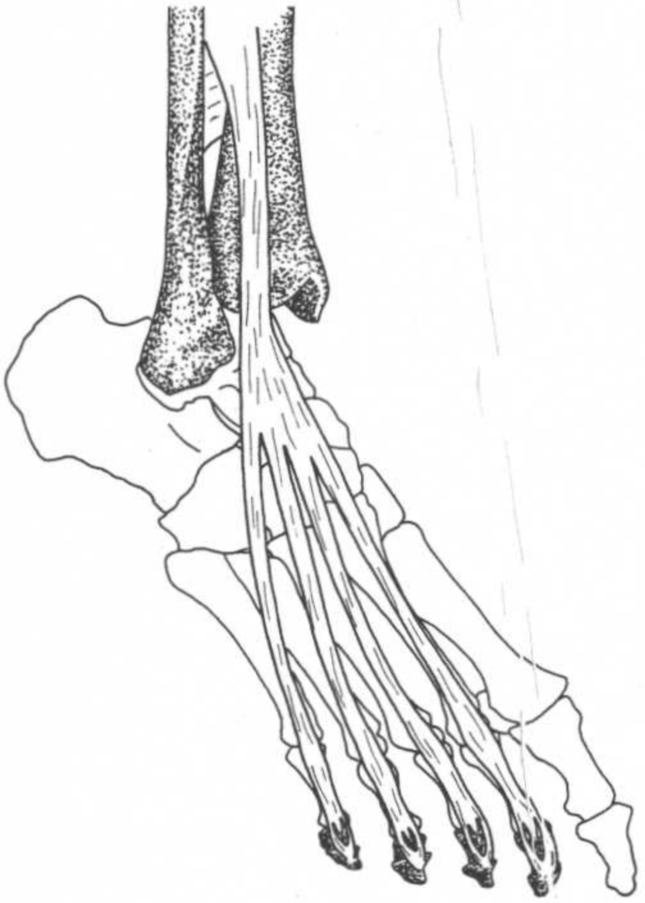
# EXTENSOR HALLUCIS LONGUS

| | |
|---|---|
| **Origin** | Middle half of anterior surface of fibula and interosseous membrane |
| **Insertion** | Base of distal phalanx of great toe |
| **Action** | Extends, hyperextends great toe, dorsiflexes and inverts (supinates) foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

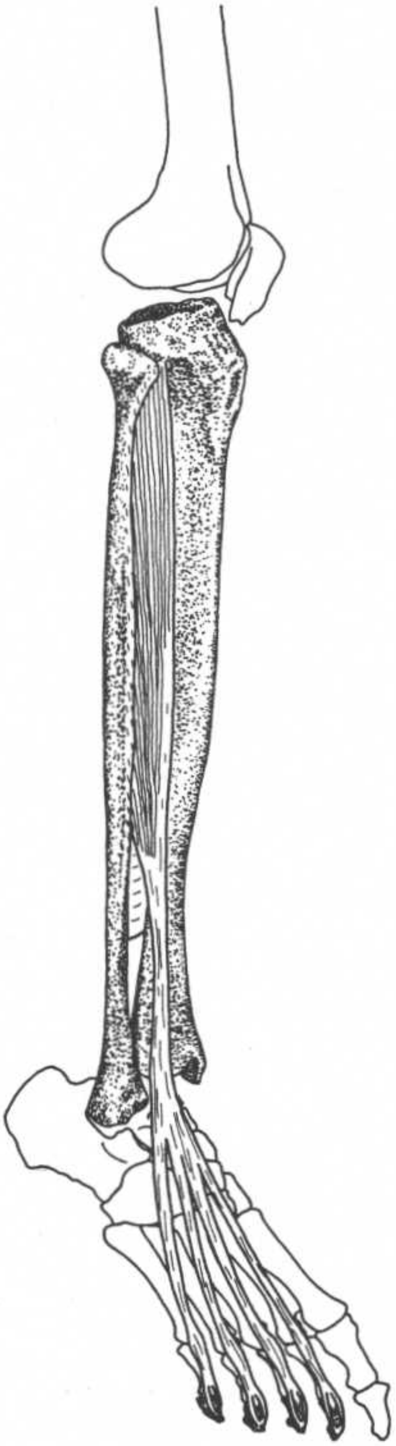
# EXTENSOR DIGITORUM LONGUS



**Foot—anterolateral view**

| | |
|---|---|
| **Origin** | Upper two-thirds of anterior surface of fibula, interosseous membrane, lateral condyle of tibia |
| **Insertion** | Along dorsal surface of four lateral toes, and then to bases of middle and distal phalanges |
| **Action** | Extends toes, dorsiflexes foot at ankle, everts foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |

Note: The lower lateral part of this muscle makes a separate insertion onto the dorsal surface of the fifth metatarsal and is called *peroneus tertius.*

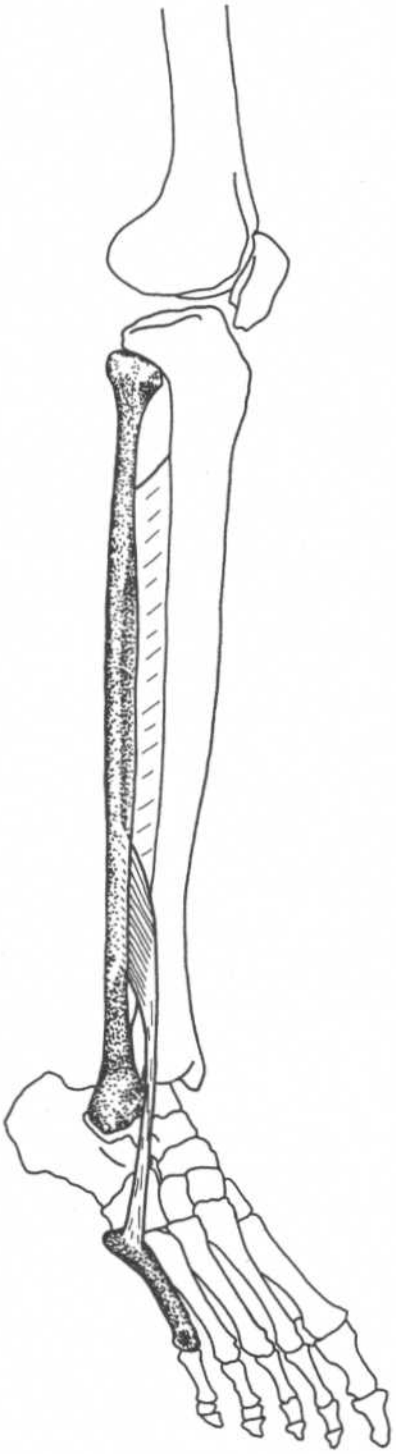


**Leg—anterolateral view**

# PERONEUS TERTIUS

*(Lower lateral part of extensor digitorum longus)*

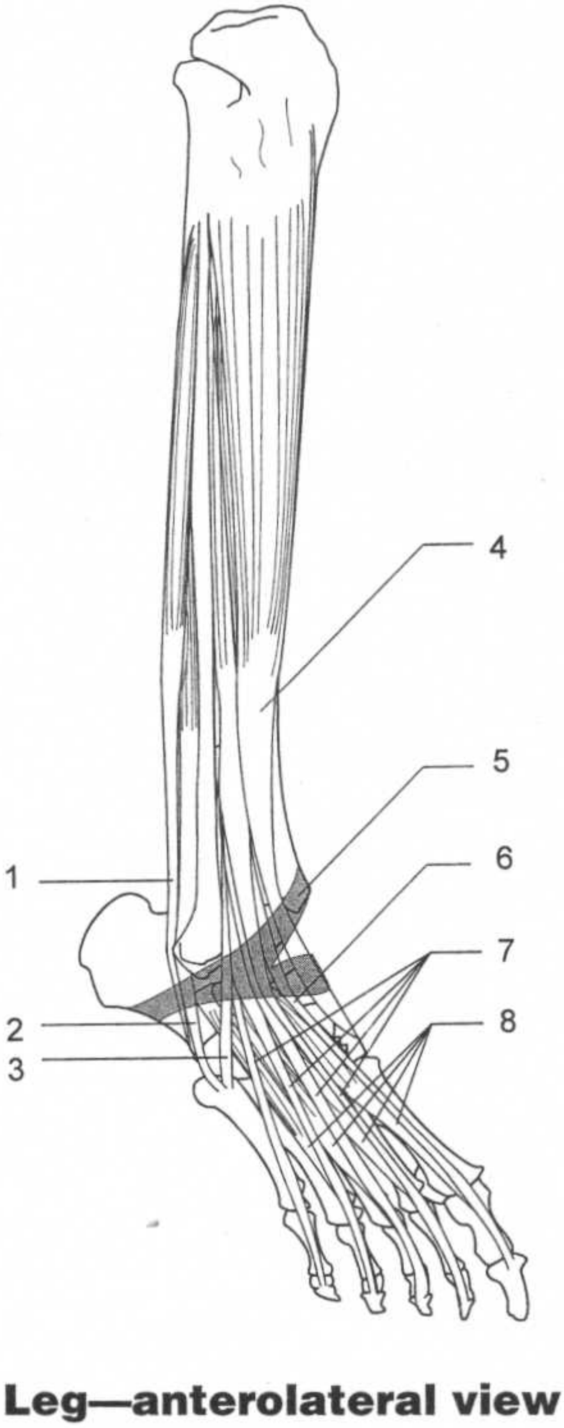
| | |
|---|---|
| **Origin** | Lower third of anterior surface of fibula and interosseous membrane |
| **Insertion** | Dorsal surface of base of fifth metatarsal bone |
| **Action** | Dorsiflexes and everts foot |
| **Nerve** | Deep peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

# ANTERIOR AND LATERAL LEG MUSCLES

1. Peroneus longus
2. Peroneus brevis
3. Peroneus tertius
4. Tibialis anterior
5. Extensor retinaculum
6. Extensor hallucis longus
7. Extensor digitorum longus
8. Extensor digitorum brevis

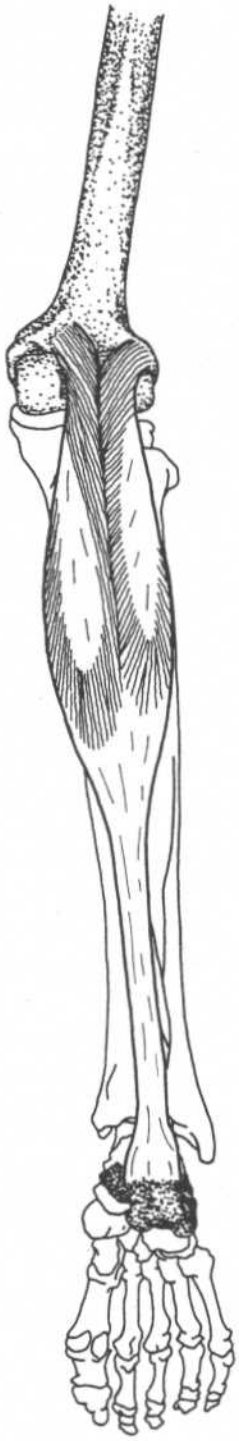


**Leg—anterolateral view**

# GASTROCNEMIUS

*(Part of triceps surae)*

| | |
|---|---|
| **Origin** | Lateral head—lateral condyle and posterior surface of femur<br>Medial head—popliteal surface of femur above medial condyle |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot, flexes leg at knee |
| **Nerve** | Tibial nerve (S1, S2) |

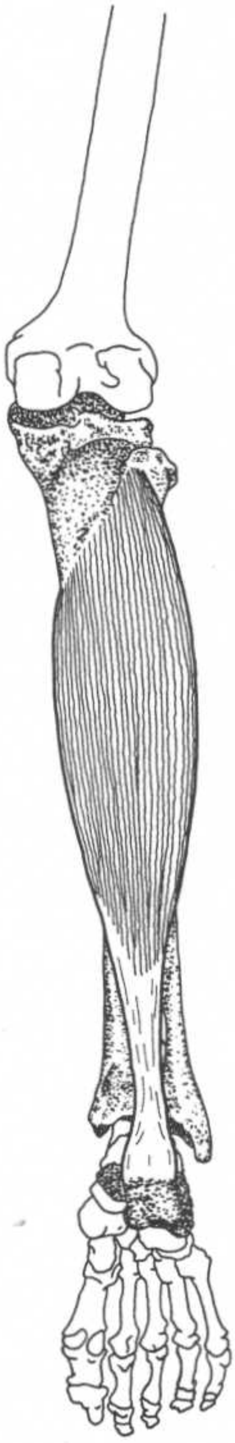


**Leg—posterior view**

# SOLEUS

*(Part of triceps surae)*

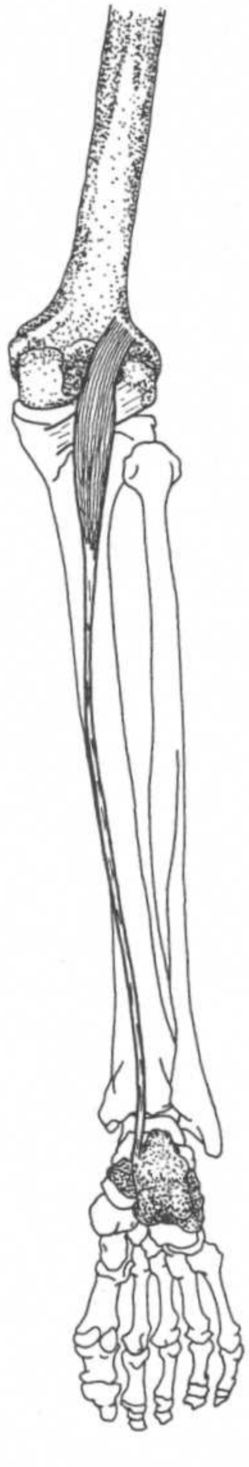
| | |
|---|---|
| **Origin** | Posterior surface of the tibia (soleal line), upper third of posterior surface of fibula, fibrous arch between tibia and fibula |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot |
| **Nerve** | Tibial nerve (S1, S2) |



**Leg—posterior view**

# PLANTARIS

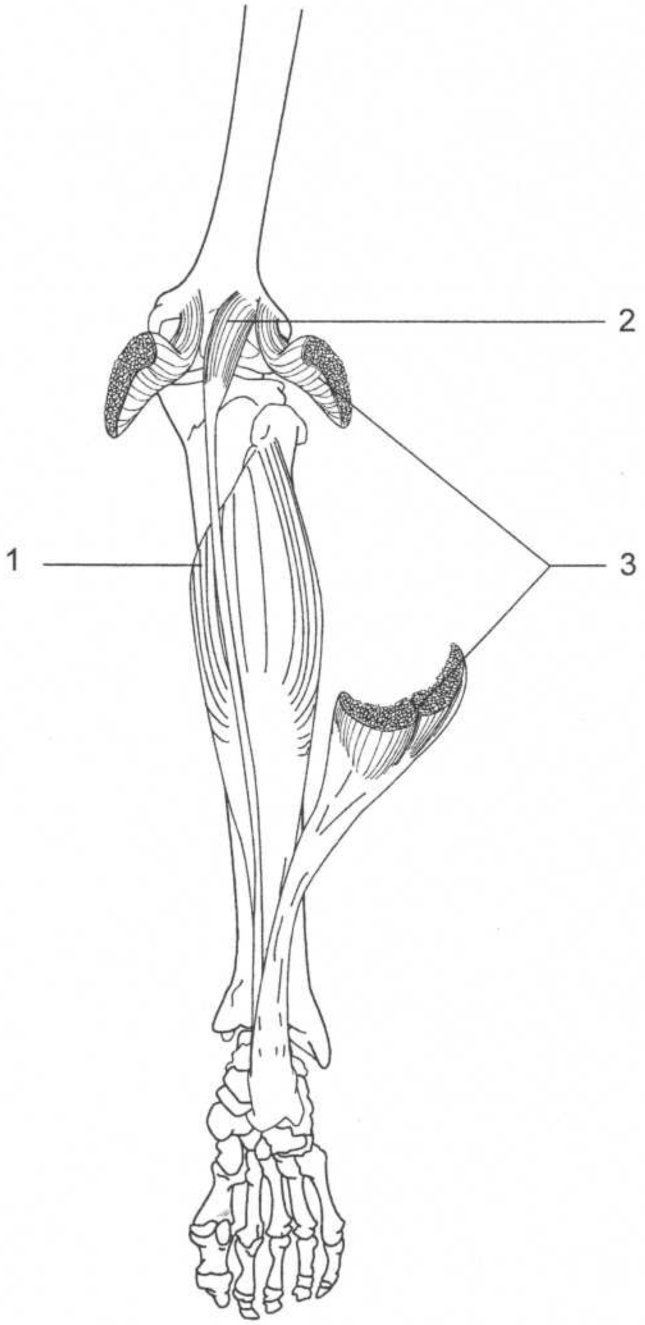
| | |
|---|---|
| **Origin** | Lateral supracondylar ridge of femur, oblique popliteal ligament |
| **Insertion** | Posterior surface of the calcaneus |
| **Action** | Plantar flexes foot, flexes leg |
| **Nerve** | Tibial nerve (L4, L5, S1) |



**Leg—posterior view**

# MUSCLES OF THE CALF

1. Soleus
2. Plantaris
3. Gastrocnemius (cut)



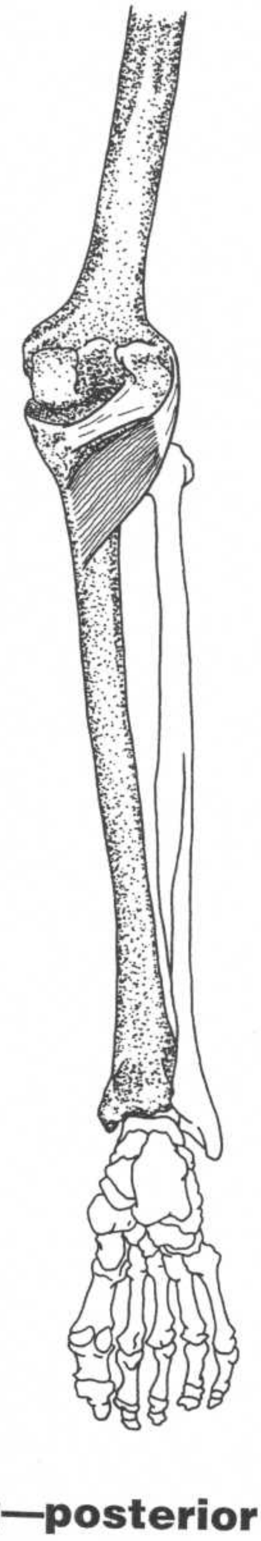
Leg—posterior view

# POPLITEUS

| | |
|---|---|
| **Origin** | Lateral surface of lateral condyle of femur |
| **Insertion** | Upper part of posterior surface of tibia |
| **Action** | Rotates leg medially, flexes leg |
| **Nerve** | Tibial nerve (L4, L5, S1) |

Note: Stern contends that this muscle stabilizes the knee by preventing lateral rotation of the tibia during medial rotation of the thigh while the foot is planted.

Reference:
Stern, JT: *Essentials of Gross Anatomy*, F. A. Davis Company, Philadelphia, 1988.

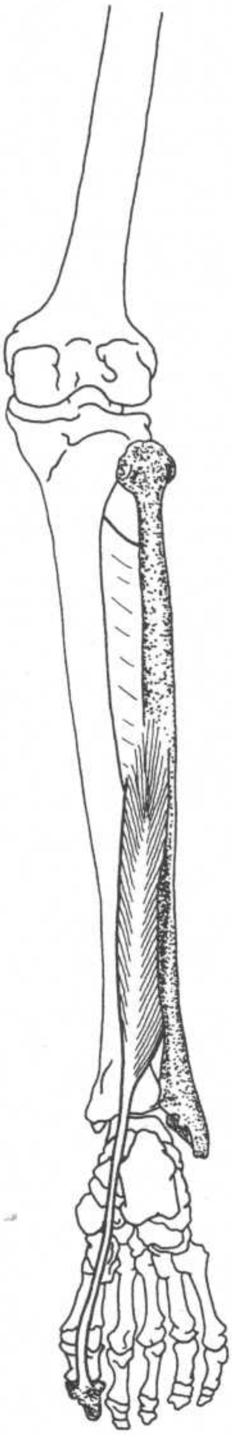


**Leg—posterior view**

# FLEXOR HALLUCIS LONGUS

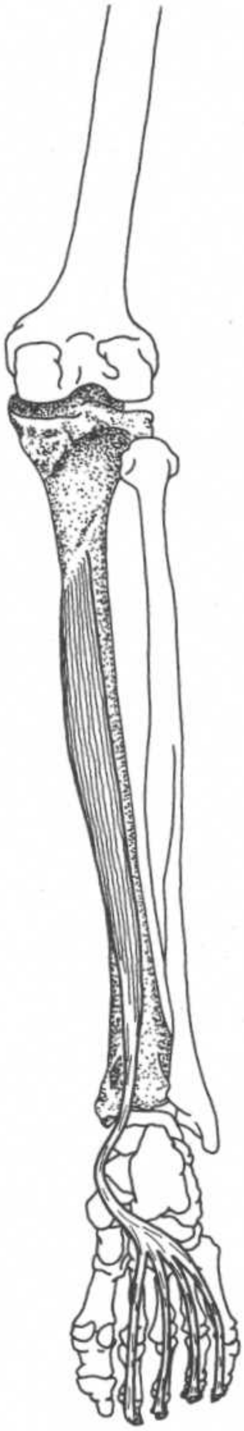
| | |
|---|---|
| **Origin** | Lower two-thirds of posterior surface of shaft of fibula, posterior intermuscular septum, interosseous membrane |
| **Insertion** | Base of distal phalanx of great toe |
| **Action** | Flexes distal phalanx of great toe, assists in plantar flexing foot, inverts foot |
| **Nerve** | Tibial nerve (L5, S1, S2) |

Note: This muscle is important in pushing off the surface in walking, running, jumping.

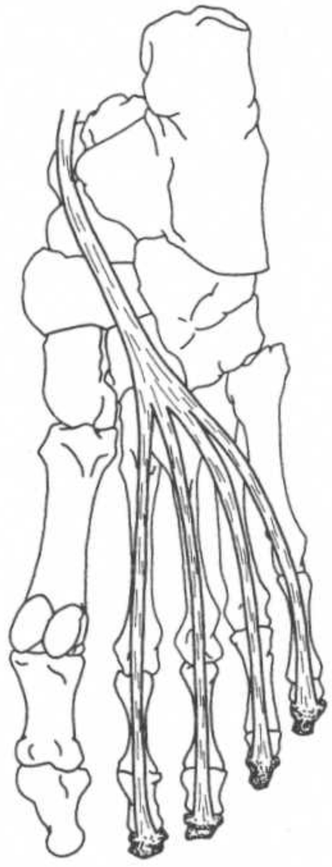


**Leg—posterior view**

# FLEXOR DIGITORUM LONGUS



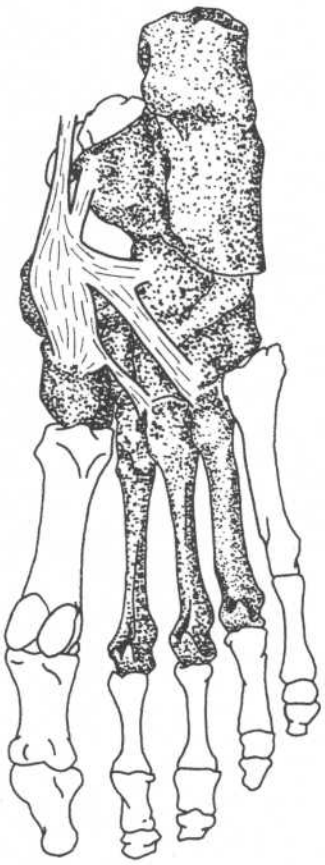
**Leg—posterior view**



**Foot—plantar view**

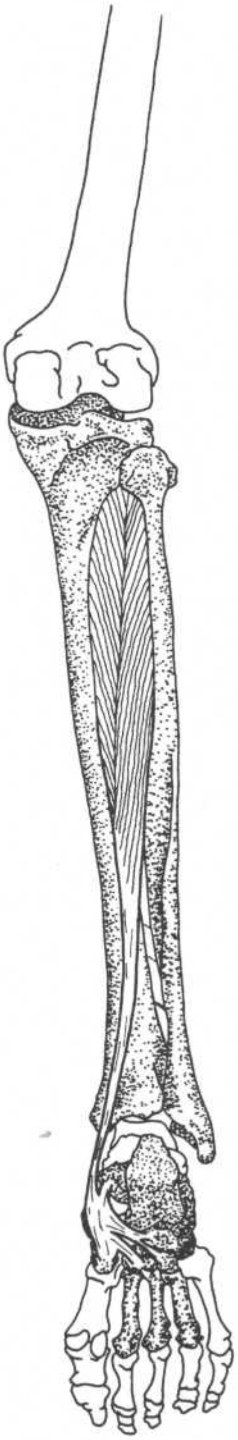
| | |
|---|---|
| **Origin** | Medial part of posterior surface of tibia |
| **Insertion** | Bases of distal phalanges of second, third, fourth, and fifth toes |
| **Action** | Flexes distal phalanges of lateral four toes, assists in plantar flexing foot, inverts foot |
| **Nerve** | Tibial nerve (L5, S1) |

# TIBIALIS POSTERIOR



**Foot—plantar view**

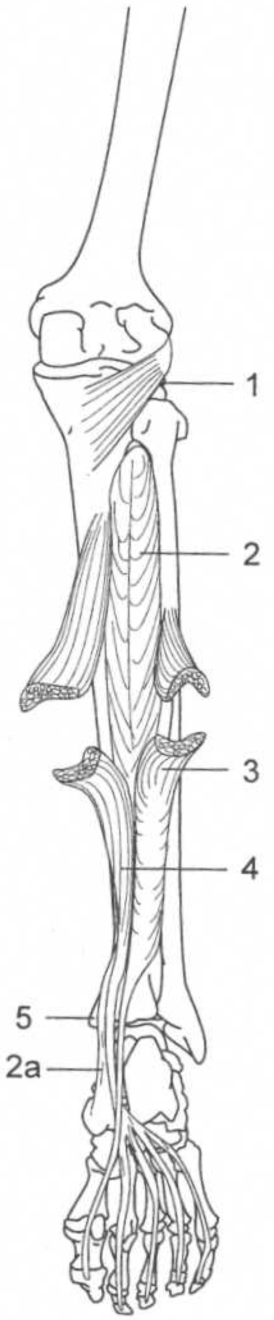
| | |
|---|---|
| **rigin** | Lateral part of posterior surface of tibia, interosseous membrane, proximal half of posterior surface of fibula |
| **nsertion** | Tuberosity of navicular bone, cuboid, cuneiforms, second, third, and fourth metatarsals, sustentaculum tali of calcaneus |
| **ction** | Plantar flexes, inverts foot |
| **erve** | Tibial nerve (L5, S1) |



**Leg—posterior view**

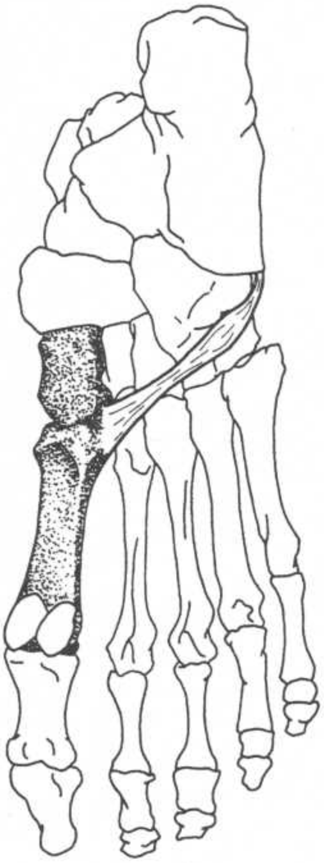
# DEEP POSTERIOR LEG MUSCLES

- **1.** Popliteus
- **2.** Tibialis posterior
- **2a.** Tendon of tibialis posterior
- **3.** Flexor hallucis longus (cut)
- **4.** Flexor digitorum longus (cut)
- **5.** Medial malleolus



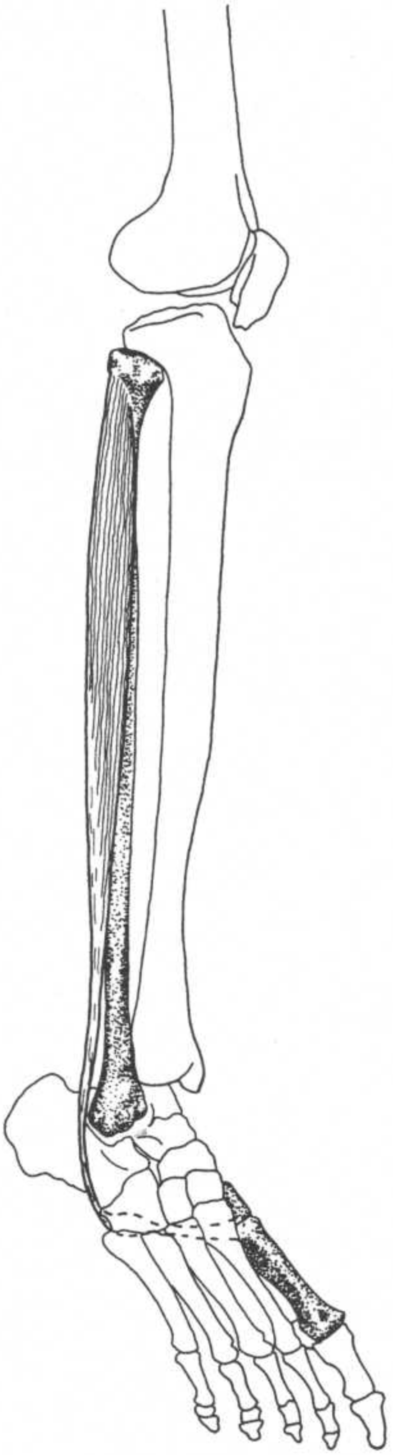
**Leg—posterior view**

# PERONEUS LONGUS



Foot—plantar view

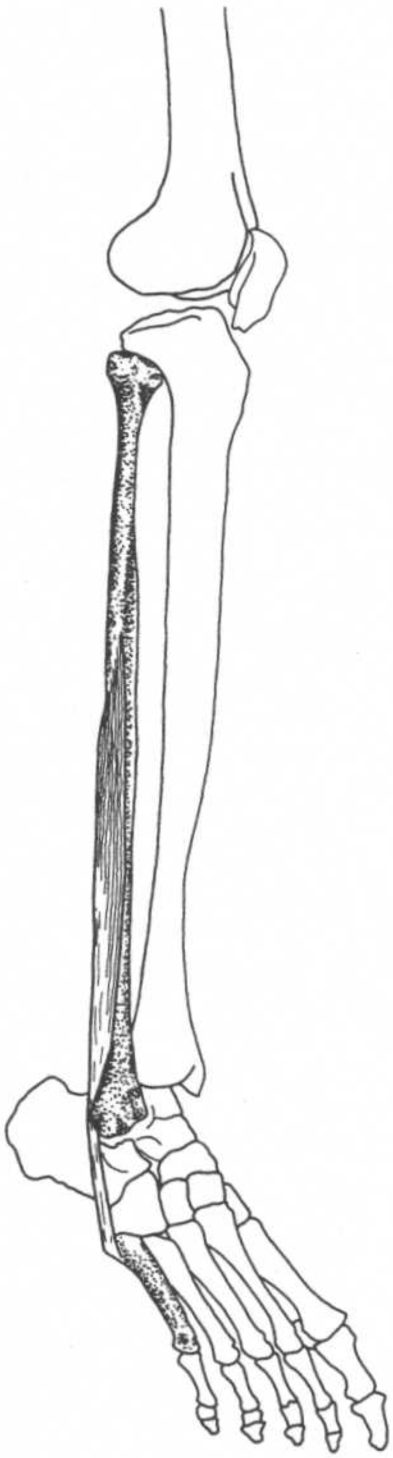
| | |
|---|---|
| **igin** | Upper two-thirds of lateral surface of fibula |
| **sertion** | Lateral side of medial cuneiform, base of first metatarsal |
| **tion** | Plantar flexes, everts foot |
| **rve** | Superficial peroneal nerve (L4, L5, S1) |



Leg—anterolateral view

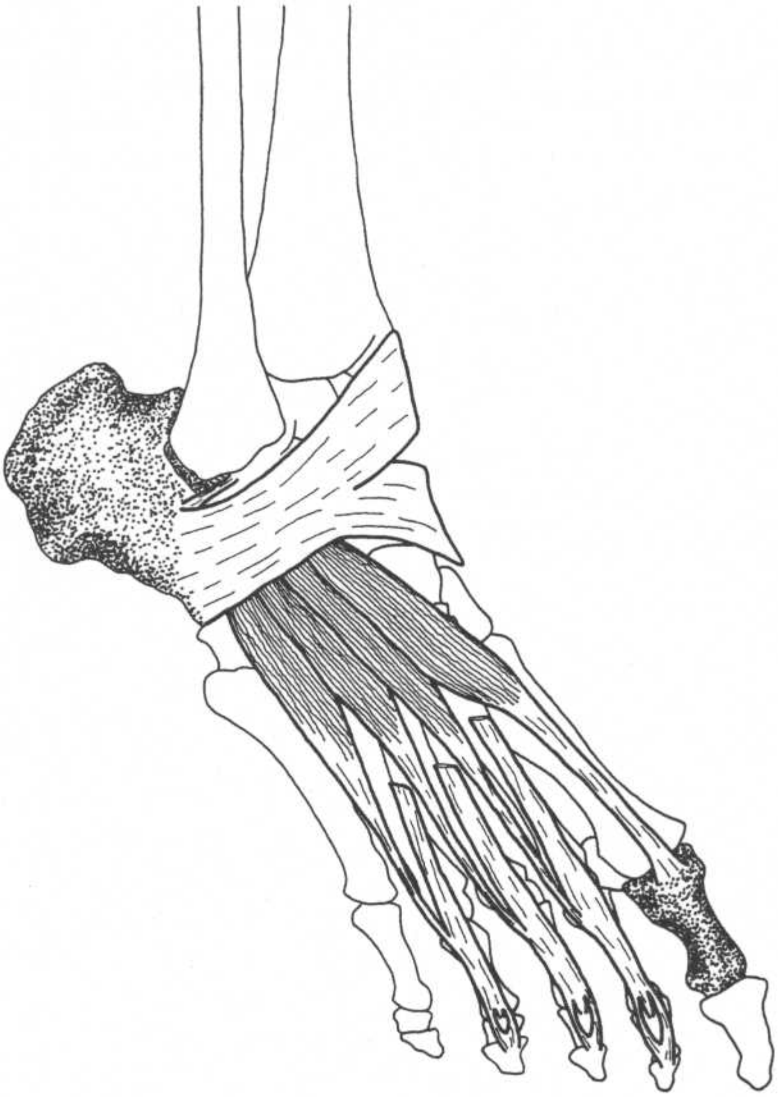
# PERONEUS BREVIS

| | |
|---|---|
| **Origin** | Lower two-thirds of lateral surface of fibula |
| **Insertion** | Lateral side of base of fifth metatarsal bone |
| **Action** | Everts, plantar flexes foot |
| **Nerve** | Superficial peroneal nerve (L4, L5, S1) |



**Leg—anterolateral view**

# EXTENSOR DIGITORUM BREVIS

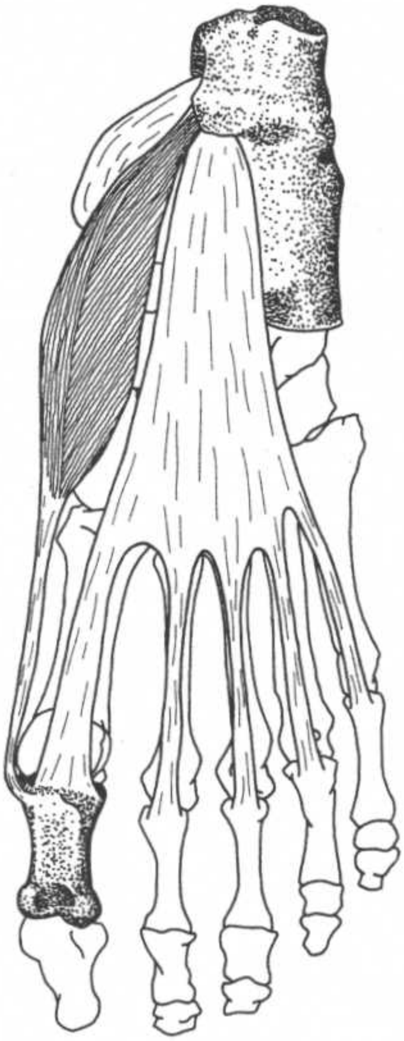


Foot—anterolateral view

| | | | |
|---|---|---|---|
| **Origin** | Anterior and lateral surfaces of calcaneus, lateral talocalcaneal ligament, inferior extensor retinaculum | **Action** | Extends the four toes |
| **Insertion** | Into base of proximal phalanx of great toe, into lateral sides of tendons of extensor digitorum longus of second, third, and fourth toes | **Nerve** | Deep peroneal nerve (L5, S1) |

# ABDUCTOR HALLUCIS

*(First layer)*



## Foot—plantar view

| | |
|---|---|
| **Origin** | Tuberosity of calcaneus, flexor retinaculum, plantar aponeurosis |
| **Insertion** | Medial side of base of proximal phalanx of great toe |
| **Action** | Abducts great toe |
| **Nerve** | Medial plantar nerve (L4, L5) |

Note: The muscles of the sole of the foot can be divided into four layers (from superficial to deep):

First layer—abductor hallucis, flexor digitorum brevis, abductor digiti minimi

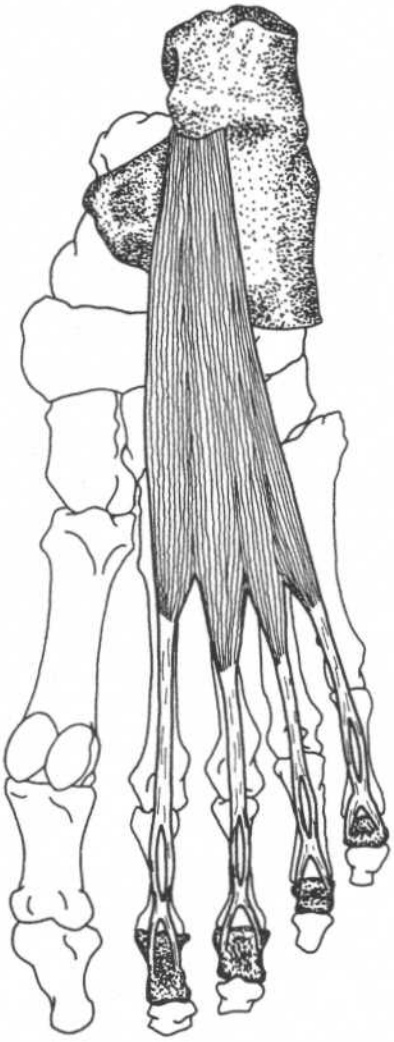
Second layer—quadratus plantae, lumbricales (tendons of flexor hallucis longus and flexor digitorum longus pass through this layer)

Third layer—flexor hallucis brevis, adductor hallucis, flexor digiti minimi brevis

Fourth layer—interossei (tendons of tibialis posterior and peroneus longus pass through this layer)

# FLEXOR DIGITORUM BREVIS

*(First layer)*

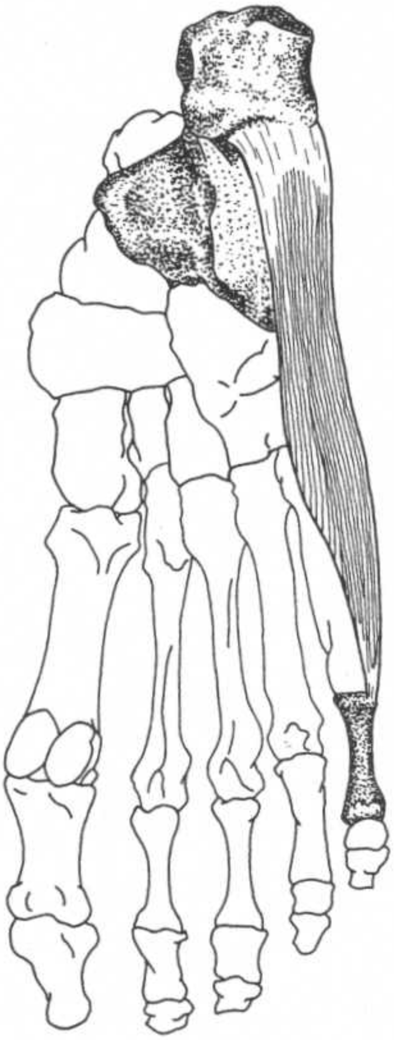


**Foot—plantar view**

| | | | |
|---|---|---|---|
| **rigin** | Tuberosity of calcaneus, plantar aponeurosis | **Action** | Flexes proximal phalanges and extends distal phalanges of second through fifth toes |
| **nsertion** | Sides of middle phalanges of second to fifth toes | **Nerve** | Medial plantar nerve (L4, L5) |

# ABDUCTOR DIGITI MINIMI

*(First layer)*

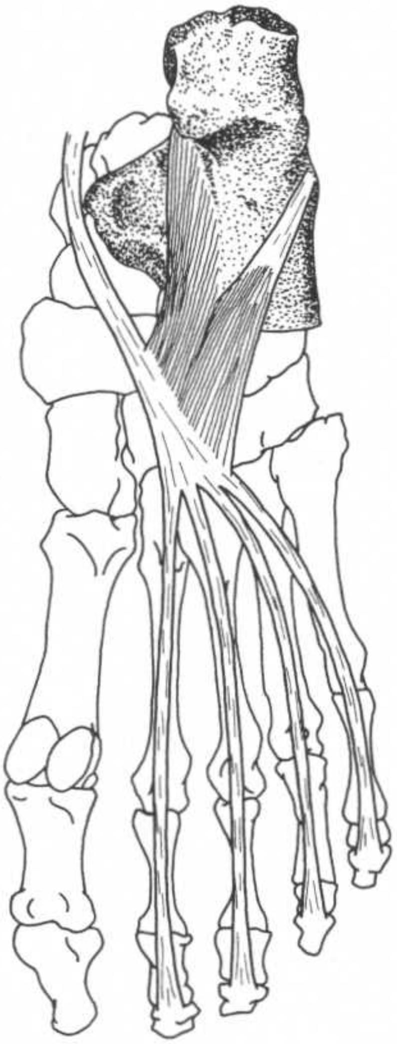


## Foot—plantar view

| | | | |
|---|---|---|---|
| **Origin** | Tuberosity of calcaneus, plantar aponeurosis | **Action** | Abducts fifth toe |
| **Insertion** | Lateral side of proximal phalanx of fifth toe | **Nerve** | Lateral plantar nerve (S1, S2) |

# QUADRATUS PLANTAE

*(Second layer)*

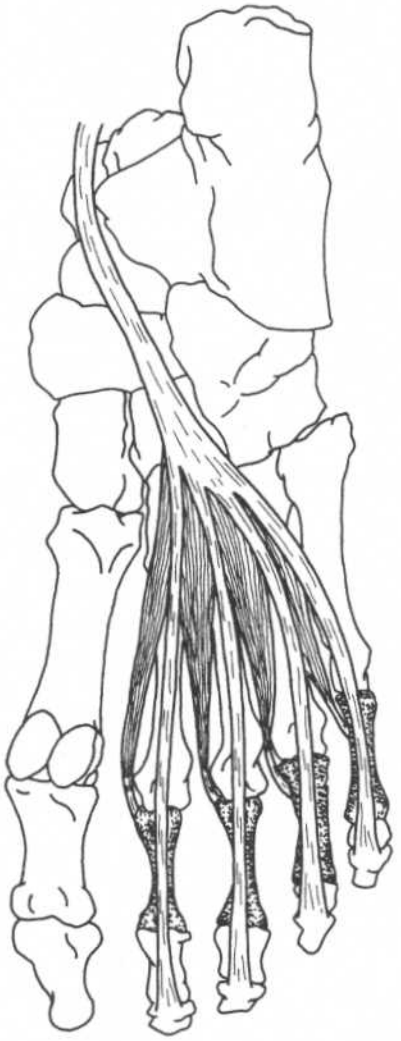


## Foot—plantar view

| | | | |
|---|---|---|---|
| **rigin** | Medial head—medial surface of calcaneus | **Action** | Flexes terminal phalanges of second through fifth toes |
| | Lateral head—lateral border of inferior surface of calcaneus | **Nerve** | Lateral plantar nerve (S1, S2) |
| **sertion** | Lateral margin of tendon of flexor digitorum longus | | |

# LUMBRICALES

*(Second layer)*

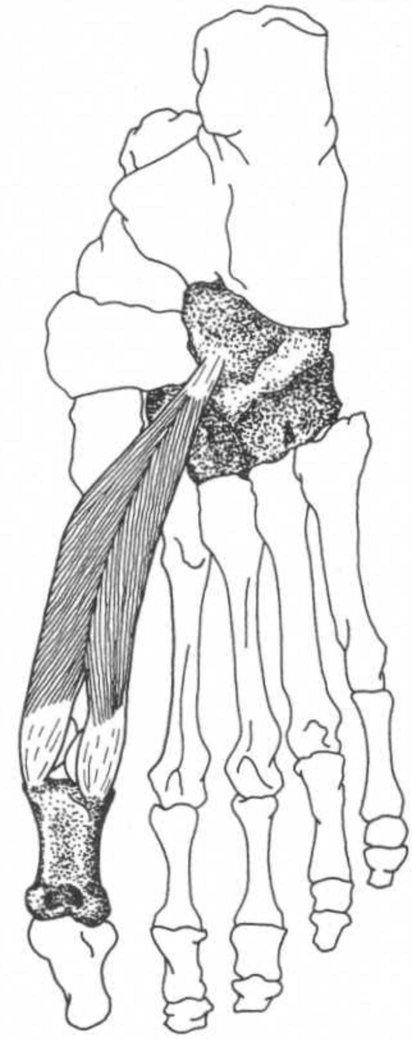


## Foot—plantar view

|  |  |
|---|---|
| **Origin** | Tendons of flexor digitorum longus |
| **Insertion** | Dorsal surfaces of proximal phalanges |
| **Action** | Flex proximal phalanges of second through fifth toes |
| **Nerve** | First lumbricalis—medial plantar nerve (L4, L5)<br>Second through fifth lumbricales—lateral plantar nerve (S1, S2) |

# FLEXOR HALLUCIS BREVIS

*(Third layer)*

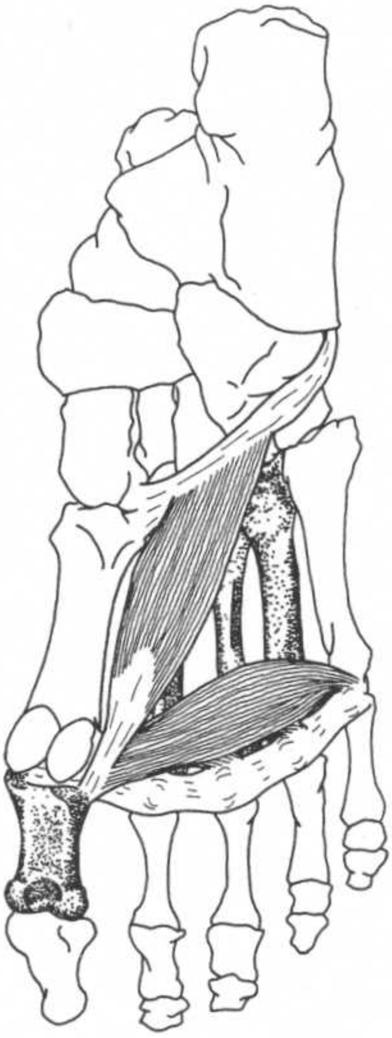


**Foot—plantar view**

| | | | |
|---|---|---|---|
| **Origin** | Cuboid bone, lateral cuneiform bone | **Action** | Flexes proximal phalanx of great toe |
| **nsertion** | Medial part—medial side of base of proximal phalanx of great toe<br>Lateral part—lateral side of base of proximal phalanx of great toe | **Nerve** | Medial plantar nerve (L4, L5, S1) |

# ADDUCTOR HALLUCIS

*(Third layer)*

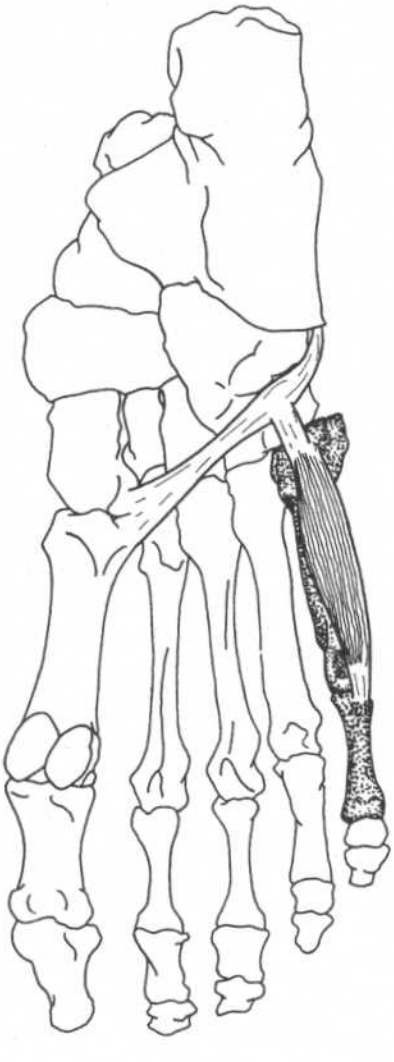


## Foot—plantar view

| | | | |
|---|---|---|---|
| **Origin** | Oblique head—second, third, and fourth metatarsal bones, and sheath of peroneus longus tendon<br>Transverse head—plantar metatarsophalangeal ligaments of third, fourth, and fifth toes, and transverse metatarsal ligaments | **Insertion** | Lateral side of base of proximal phalanx of great toe |
| | | **Action** | Adducts great toe |
| | | **Nerve** | Lateral plantar nerve (S1, S2) |

# FLEXOR DIGITI MINIMI BREVIS

*(Third layer)*

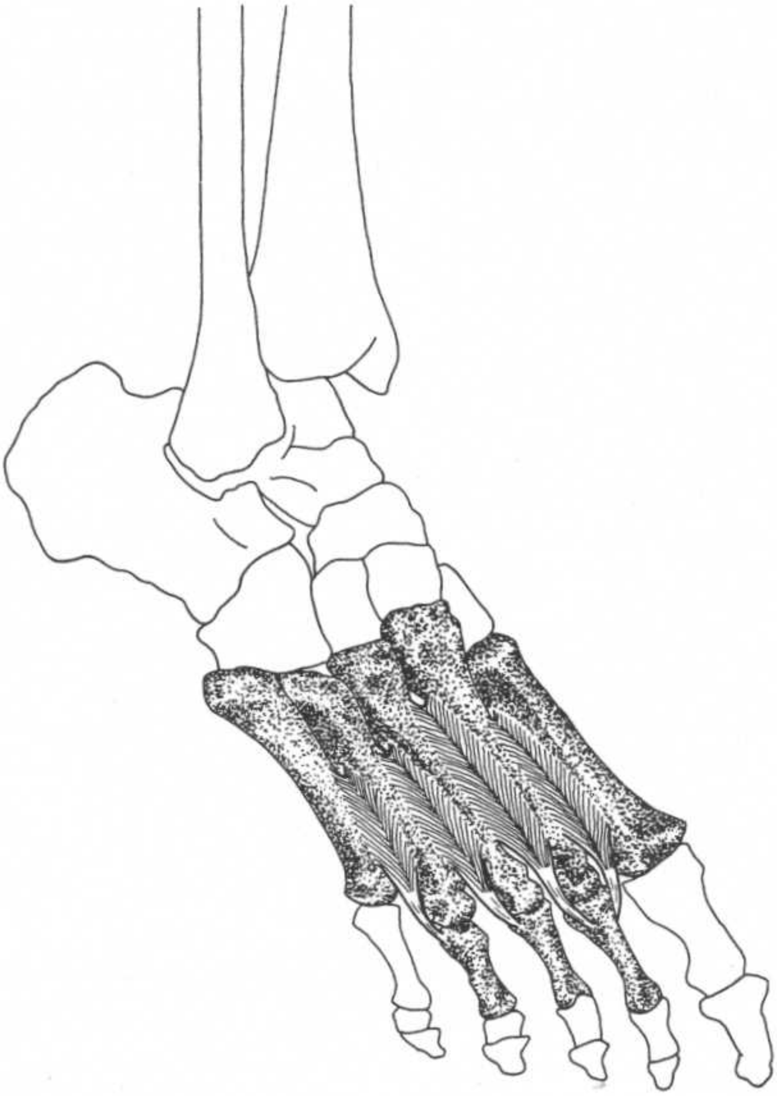


## Foot—plantar view

| | |
|---|---|
| **gin** | Base of fifth metatarsal, sheath of peroneus longus tendon |
| **ertion** | Lateral side of base of proximal phalanx of fifth toe |
| **Action** | Flexes proximal phalanx of fifth toe |
| **Nerve** | Lateral plantar nerve (S1, S2) |

# DORSAL INTEROSSEI

*(Fourth layer; four muscles)*

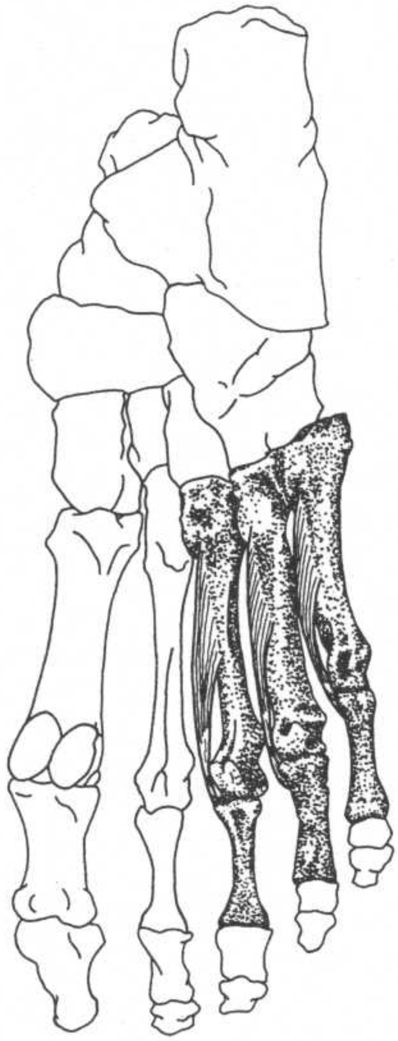


**Foot—anterolateral view**

| | | | |
|---|---|---|---|
| **Origin** | Adjacent sides of metatarsal bones | **Action** | Abduct toes, flex proximal phalanges |
| **Insertion** | Bases of proximal phalanges<br>First—medial side of proximal phalanx of second toe<br>Second, third, fourth—lateral sides of proximal phalanges of second, third, and fourth toes | **Nerve** | Lateral plantar nerve (S1, S2) |

# PLANTAR INTEROSSEI

*(Fourth layer; three muscles)*



**Foot—plantar view**

| | |
|---|---|
| **Origin** | Bases and medial sides of third, fourth, and fifth metatarsal bones |
| **Insertion** | Medial sides of bases of proximal phalanges of same toes |
| **Action** | Adduct toes, flex proximal phalanges |
| **Nerve** | Lateral plantar nerve (S1, S2) |

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